UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

NMFS Tracking No.:
2003/00387

October 16, 2003

Mr. Richard Smith
Forest Supervisor
Boise National Forest
1249 South Vinnell Way, Suite 200
Boise, Idaho 83709

RE: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Bear Valley Roads Improvement Project on Bear Valley, Elk, Casner and Cub Creeks, Snake River spring/summer chinook salmon and steelhead, Upper Middle Fork Salmon River - HUC 17060205, Bear Valley Creek Watershed, Valley County, Idaho (Two Actions)

Dear Mr. Smith:

Enclosed is a biological opinion (Opinion) prepared by NOAA's National Marine Fisheries Service (NOAA Fisheries) pursuant to section 7 of the Endangered Species Act (ESA) on the effects of the proposed Bear Valley Roads Improvement Project on Bear Valley, Elk, Casner and Cub Creeks, Upper Middle Fork Salmon River - HUC 17060205, Bear Valley Creek Watershed, Valley County, Idaho. In this Opinion, NOAA Fisheries concludes that the proposed action is not likely to jeopardize the continued existence of ESA-listed Snake River spring/summer chinook salmon and Snake River steelhead, and is not likely to destroy or adversely modify designated critical habitat. As required by section 7 of the ESA, NOAA Fisheries includes reasonable and prudent measures with non-discretionary terms and conditions that NOAA Fisheries believes are necessary to minimize the impact of incidental take associated with this action.

This document contains a consultation on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and its implementing regulations (50 CFR Part 600). NOAA Fisheries concludes that the proposed action would adversely affect designated EFH for listed salmon. As required by section 305(b)(4)(A) of the MSA, included are conservation recommendations that NOAA Fisheries believes will avoid, minimize, mitigate, or otherwise offset adverse effects on EFH resulting from the proposed action. As described in the enclosed consultation, 305(b)(4)(B) of the MSA requires that a Federal action agency must provide a detailed response in writing within 30 days of receiving EFH conservation recommendations.

If you have any questions regarding this letter, please contact Debbie Artimez of my staff in the Idaho Habitat Branch office at 208-378-5648.

Sincerely,

for Michael R Crouse

D. Robert Lohn
Regional Administrator

cc: S. Rainville - USFS
J. Foss - USFW
D. Allen - IDFG
K. Kutchins - Shoshone-Bannock Tribes
J. Pinkham - Nez Perce Tribe
W. Rogers - USFS

Endangered Species Act Section 7 Consultation Biological Opinion
and
Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Bear Valley Roads Improvement Project
on Bear Valley, Elk, Casner and Cub Creeks
Snake River spring/summer chinook salmon and steelhead
Upper Middle Fork Salmon River - HUC 17060205
Bear Valley Watershed
Valley County, Idaho

Lead Action Agency: U.S. Forest Service, Boise National Forest

Consultation Conducted By: NOAA's National Marine Fisheries Service,
Northwest Region

Date Issued: 10/16/2003

Issued by: for Michael R Crouse
D. Robert Lohn
Regional Administrator

NMFS Tracking No.:2003/00387

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1. INTRODUCTION

The Endangered Species Act (ESA) of 1973 (16 USC 1531-1544), as amended, establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with NOAA's National Marine Fisheries Service (NOAA Fisheries) and U.S. Fish and Wildlife Service (together "Services"), as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitats. This biological opinion (Opinion) is the product of an interagency consultation pursuant to section 7(a)(2) of the ESA and implementing regulations 50 CFR 402.

The analysis also fulfills the Essential Fish Habitat (EFH) consultation requirements under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (section 305(b)(2)).

The Boise National Forest (BNF) proposes to reconstruct two segments (0.14 mile combined) of Forest Service (FS) Road 579 and six segments (0.09 mile combined) of FS Road 582, relocate 0.3 mile of FS Road 582, replace the FS Road 563 Cub Creek crossing culvert, replace the FS Road 582 Casner Creek crossing culvert, and remove five small culverts in Casner Creek. The purpose of the Bear Valley Roads Improvement Project is to relocate roads further away from adjacent streams to reduce sediment input, to replace culverts to restore fish migration routes, and to decommission five culverts and a spur road off of FS Road 582 to eliminate effects on Casner Creek. The BNF is proposing the action according to its authority under the National Forest Management Act of 1976. The administrative record for this consultation is on file at the Idaho Habitat Branch office.

1.1 Background and Consultation History

The BNF has coordinated with NOAA Fisheries through Level One meetings, submitting and addressing comments on two draft Biological Assessments (BA). Through these meetings NOAA Fisheries has discussed with the BNF opportunities to reduce or avoid potential adverse effects on anadromous fish. NOAA Fisheries received a complete BA and Essential Fish Habitat (EFH) assessment on the Bear Valley Roads Improvement Project on June 02, 2003, and consultation was initiated at that time.

The action is likely to affect tribal trust resources. Fishery resources are expected to benefit in the long-term from the implementation of the project. NOAA Fisheries has contacted the Shoshone-Bannock, Shoshone-Pauite, and the Nez Perce tribes pursuant to the Secretarial Order (June 5, 1997). The Nez Perce Tribe responded with no concerns about the project. Coordination with the Shoshone-Bannock and Shoshone-Pauite Tribes are still underway.

1.2 Proposed Action

Proposed actions are defined in the Services' consultation regulations (50 CFR 402.02) as "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas." Additionally, U.S. Code (16 U.S.C. 1855(b)(2)) further defines a Federal action as "any action authorized, funded, or undertaken or proposed to be authorized, funded, or undertaken by a Federal agency." Because the BNF proposes to fund the project that may affect listed resources, it must consult under ESA section 7(a)(2) and MSA section 305(b)(2).

The Bear Valley Roads Improvement Project involves multiple activities throughout these following 6^{th} field Hydrologic Unit Codes (HUCs): Upper Bear (170602050804), Cache (170602050803), and Lower Elk (170602050901) Creeks, which all lie within the Upper Middle Fork Salmon River subbasin, Bear Valley Creek Watershed in the BNF. Detailed maps are provided in the BA. Project activities include reconstructing and relocating roads, replacement of culverts, and decommissioning and the removal of five culverts along with a section of a spur road. Work would begin as early as July 15 and end before September 15, with actual "in-channel" work taking approximately 7 days for Casner Creek culvert replacement; 1 day for the Casner Creek culvert removal, and 6 days for the Cub Creek culvert replacement (14 days total). The road reconstruction work will take approximately 1 week to complete, and 3 weeks for the road relocation work.

Figure 1. Proposed Project Area

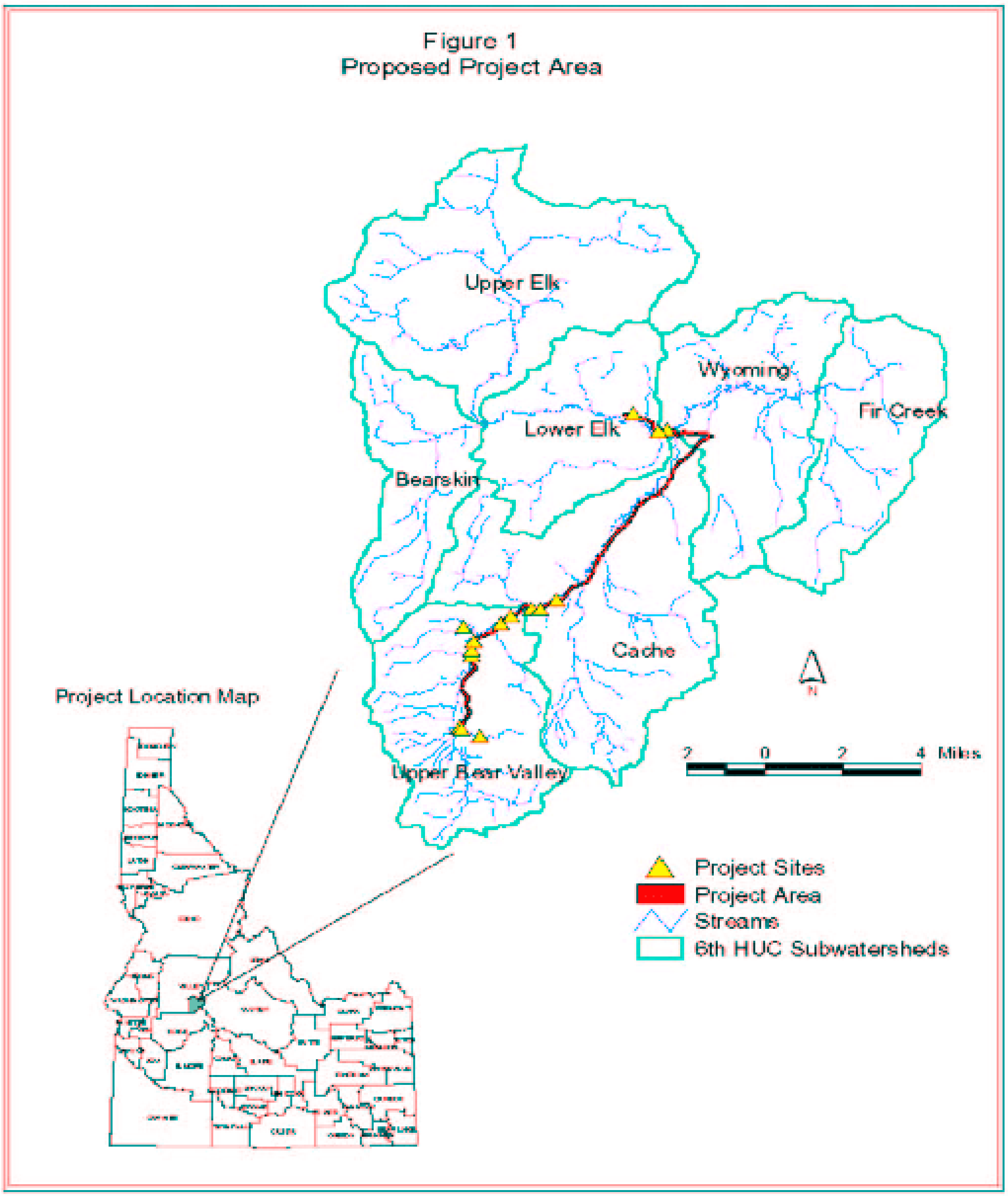


Figure 2. Proposed project sites associated with Forest Service Road 579

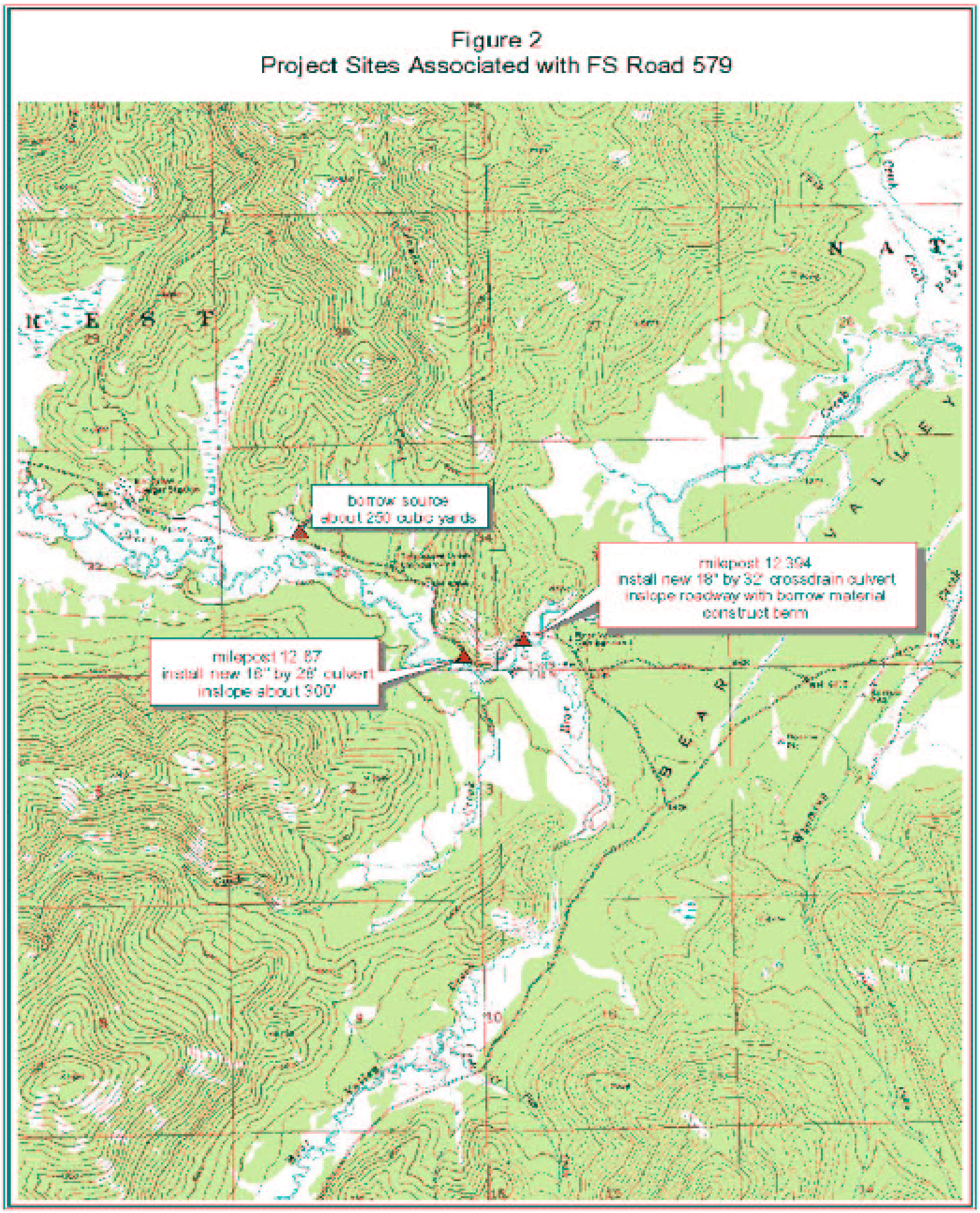
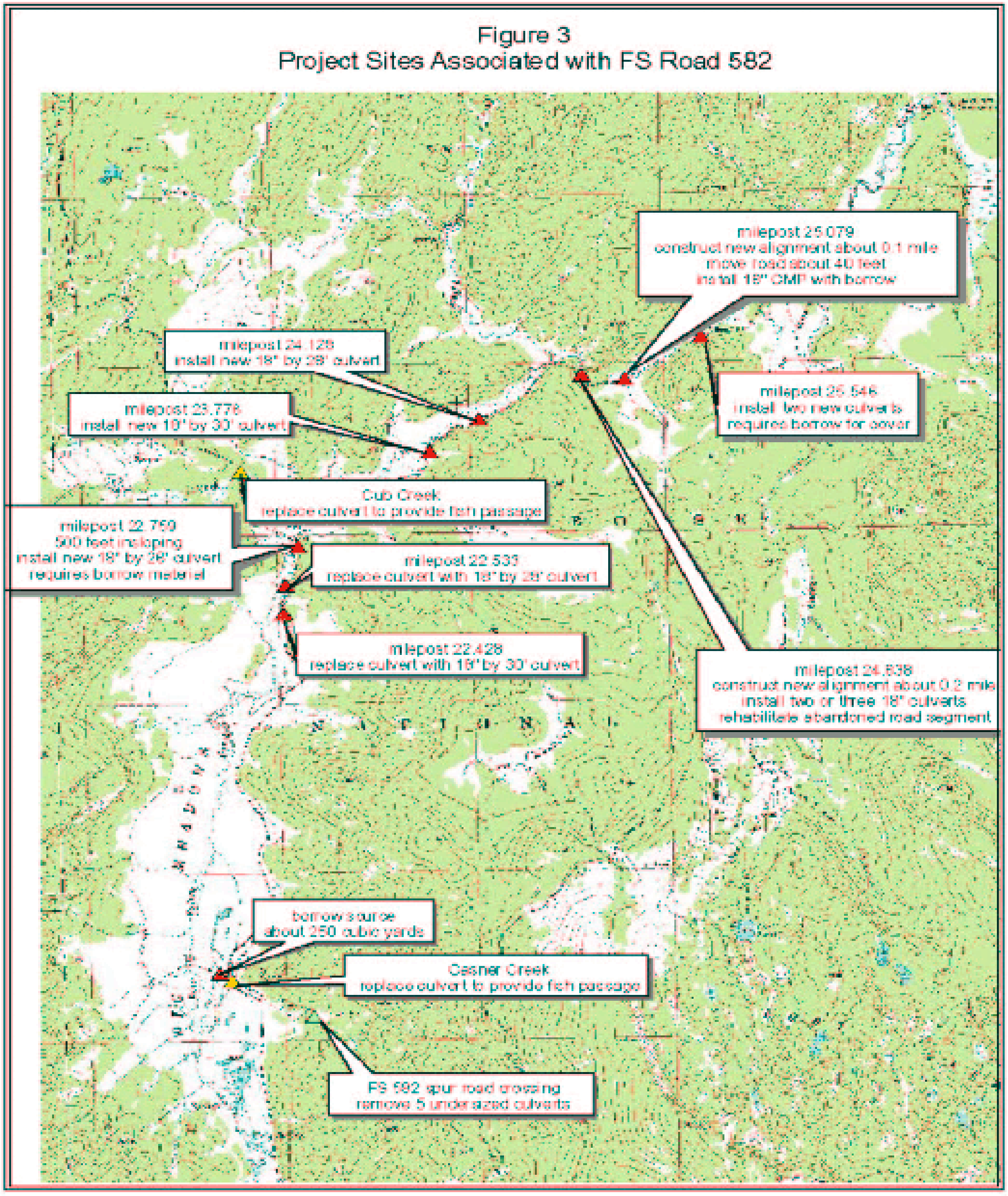


Figure 3. Proposed project sites associated with Forest Service Road 582



- **Road Reconstruction**

Two segments (0.14 mile combined) of FS Road 579 and six segments (0.09 mile combined) of FS Road 582 would be reconstructed to reduce sediment inputs from the road to Bear Valley Creek. The following techniques will be implemented, along with additional measures (if determined necessary during project implementation) to reduce sedimentation:

- Changing road template from outslope to inslope to improve drainage away from streams
- Replacing degraded culverts
- Installing additional cross-drain culverts to improve road drainage away from streams
- Adding spot rock/gravel (as needed)
- Constructing outslope berm to prevent road runoff from running down bare slopes
- Vegetating and/or adding spot rock to relief culvert outlets

Additional roadway materials needed would be obtained from existing borrow areas on FS Road 582 and on FS Road 579. No blasting or crushing will be needed at the borrow sites; the material will be excavated.

- **Road Relocation**

In addition to reconstruction of segments of FS Road 582, two segments (0.3 mile total) of FS Road 582 would be relocated to reduce sediment inputs from the road into Bear Valley Creek. The road segments will be moved onto a bench above Bear Valley Creek and away from the stream. The 0.3 mile of existing FS Road 582 roadway would be obliterated and native riparian and upland vegetation re-established.

Construction of the road on the bench will include small areas of cut and fill where the road transitions onto and off the bench. Cut and fill quantities will be balanced to minimize need for off-site fill materials. Construction of the road bed on the bench will entail scraping a level surface to build the roadway base onto which the roadway would be built. Existing lodgepole pine will be cut and used in rehabilitation or piled. Roadway materials will be obtained from an existing borrow area on FS Road 582. No blasting or crushing will be needed at the borrow sites, the material will be excavated. Obliteration of the existing FS Road 582 segments after relocation will involve: (1) blocking vehicle access; (2) reclamation of the roadway surface and adjacent area to a condition suitable for plant establishment and growth; and (3) establishment of streamside vegetation. The planting bed will be prepared by ripping the surface to reduce compaction. The planting bed surface will be shaped to create a local topography that blends into the natural topography. Finally, the planting bed will be smoothed to prepare a suitable seed bed. Riparian and upland plants will be established through a combination of native seeding and planting cuttings or container-grown woody species from a nursery.

- **Culvert Replacement**

The existing culvert at Cub Creek on FS Road 563 will be removed and replaced with a bottomless arch culvert. The existing culvert of Casner Creek on FS Road 582 will also be removed and replaced with a bottomless arch culvert. Both culverts are currently impairing juvenile (but not adult except during low flows) fish migration for two reasons: fast water velocity within the culverts, and steep drops between the downstream end of the culverts and the water surface of the streams. The objective is for the culverts to allow year-round migration, both upstream and downstream, for all sizes of bull trout, chinook salmon, and steelhead.

Construction activities involved in culvert replacement include:

- Installing temporary in-stream sediment filters
- Constructing the temporary diversion and bypass channel
- Diverting the stream(s) into the bypass
- Excavating the existing culvert
- Excavating new floodplain in current crossing
- Constructing grade control structures
- Installing a new bottomless arch culvert
- Implementing erosion control/re-vegetation
- Diverting the stream back into the original channel
- Filling in and rehabilitating the bypass channel area
- Depositing all removed culvert materials at an approved site in Lowman

Removal of the culverts will involve temporarily disturbing 1,550 square feet of area around the Cub Creek culvert and 1,650 square feet of area around the Casner Creek culvert. Construction of the diversion channels will result in temporary disturbance of 1,400 square feet of area at Cub Creek and 1,600 square feet of area at Casner Creek.

Five small undersized culverts on Casner Creek under a spur of the 582 Road, approximately 0.5 mile upstream of the FS Road 582 Casner Creek crossing, will also be removed, but not replaced. The crossing will be rehabilitated and vehicle access (including ATVs) to the crossings blocked with earthen barriers. Construction activities involved in removing these culverts include:

- Installing temporary in-stream sediment filters
- Excavating road fill and existing culverts

- Shaping channel bottom
- Constructing gentle slopes from roadway to stream and grade streambanks at road crossing to match upstream and downstream locations
- Installing vehicle barriers
- Placing erosion control features and revegetating with streamside vegetation on constructed slopes
- Depositing all removed culvert materials at an approved site in Lowman

1.3 Description of the Action Area

An action area is defined by the Services' regulations (50 CFR Part 402) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The action area affected by the proposed action starts at the project location on Elk Creek and extends downstream to Bear Valley Creek. The fourth field HUC encompassing the action area is the Upper Middle Fork Salmon River (17060205). This area serves as migratory corridor for juveniles and adults, spawning, and rearing for salmonid Evolutionarily Significant Units (ESUs) listed in Table 1.

2. ENDANGERED SPECIES ACT - BIOLOGICAL OPINION

The objective of this Opinion is to determine whether the Bear Valley Roads Improvement Project is likely to jeopardize the continued existence of Snake River spring/summer chinook salmon and steelhead, or destroy or adversely modify chinook salmon designated critical habitat.

2.1 Evaluating the Effects of the Proposed Action

The standards for determining jeopardy and destruction or adverse modification of critical habitat are set forth in section 7(a)(2) of the ESA. In conducting analyses of habitat-altering actions under section 7 of the ESA, NOAA Fisheries uses the following steps of the consultation regulations and when appropriate[1] combines them with The Habitat Approach (NMFS 1999): (1) Consider the biological requirements and status of the listed species; (2) evaluate the relevance of the environmental baseline in the action area to the species' current status; (3) determine the effects of the proposed or continuing action on the species, and whether the action is consistent with any available recovery strategy; and

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[1]The Habitat Approach is intended to provide guidance to NOAA Fisheries staff for conducting analyses, and to explain the analytical process to interested readers. As appropriate, the Habitat Approach may be integrated into the body of Opinions. NOAA staff are encouraged to share the Habitat Approach document with colleagues from other agencies and private entities who are interested in the premises and analysis methods.

(4) determine whether the species can be expected to survive with an adequate potential for recovery under the effects of the proposed or continuing action, the effects of the environmental baseline, and any cumulative effects, and considering measures for survival and recovery specific to other life stages. In completing this step of the analysis, NOAA Fisheries determines whether the action under consultation, together with all cumulative effects when added to the environmental baseline, is likely to jeopardize the ESA-listed species or result in the destruction or adverse modification of critical habitat. If jeopardy or adverse modification are found, NOAA Fisheries may identify reasonable and prudent alternatives for the action that avoid jeopardy and/or destruction or adverse modification of critical habitat.

The fourth step above (jeopardy/adverse modification analysis) requires a two-part analysis. The first part focuses on the action area and defines the proposed action's effects in terms of the species' biological requirements in that area (i.e., effects on essential features). The second part focuses on the species itself. It describes the action's effects on individual fish, populations, or both, and places that impact in the context of the ESU as a whole. Ultimately, the analysis seeks to determine whether the proposed action is likely to jeopardize a listed species' continued existence or destroy or adversely modify its critical habitat.

2.1.1 Biological Requirements

The first step NOAA Fisheries uses when applying ESA section 7(a)(2) to the listed ESUs considered in this Opinion includes defining the species' biological requirements within the action area. Biological requirements are population characteristics necessary for the listed ESUs to survive and recover to naturally reproducing population sizes at which protection under the ESA would become unnecessary. The listed species' biological requirements may be described as characteristics of the habitat, population or both (McElhany *et al*. 2000). Interim recovery targets established by NOAA Fisheries for ESA-listed fish species potentially affected by the proposed action are 41,900 individuals for Snake River spring/summer chinook salmon and 53,700 individuals for Snake River steelhead (NMFS 2002). Interim recovery targets are also available at the following website: *http://www.nwr.noaa.gov/1habcon/habweb/habguide/appendix_b.pdf*

For actions that affect freshwater habitat, NOAA Fisheries may describe the habitat portion of a species' biological requirements in terms of a concept called properly functioning condition (PFC). The PFC is defined as the sustained presence of natural[2] habitat-forming processes in a watershed that are necessary for the long-term survival of the species through the full range of environmental variation (NMFS 1999). The PFC, then, constitutes the habitat component of a species' biological requirements. Although NOAA Fisheries is not required to use a particular procedure to describe

[2] The word "natural" in this definition is not intended to imply "pristine," nor does the best available science lead us to believe that only pristine wilderness will support salmon.

biological requirements, it typically considers the status of habitat variables in a matrix of pathways and indicators (MPI) (NMFS 1996) that were developed to describe PFC in forested montane watersheds. In the PFC framework, baseline environmental conditions are described as “properly functioning,” “at risk,” or “not properly functioning.”

The Bear Valley Roads Improvement Project would occur within designated critical habitat for Snake River spring/summer chinook salmon. Freshwater critical habitat can include all waterways, substrates, and adjacent riparian areas[3] below longstanding, natural impassable barriers (i.e., natural waterfalls in existence for at least several hundred years) and dams that block access to former habitat (see citations in Table 1).

Essential features of critical habitat for the listed species are: (1) substrate, (2) water quality, (3) water quantity, (4) water temperature, (5) water velocity, (6) cover/shelter, (7) food (juvenile only), (8) riparian vegetation, (9) space, and (10) safe passage conditions. For this consultation, the essential features that function to support successful adult and juvenile migration, adult holding, spawning, incubation, and rearing include: substrate, water quality, water quantity, water velocity, cover/shelter, food (juvenile only), riparian vegetation, and space. All of these essential features of critical habitat are included in the MPI (NMFS 1996) (discussed in more detail in Section 2.2.1).

2.1.2 Status and Generalized Life History of Listed Species

In this step, NOAA Fisheries also considers the current status of the listed species within the action area, taking into account population size, trends, distribution, and genetic diversity. To assess the current status of the listed species, NOAA Fisheries starts with the determinations made in its decision to list the species and also considers any new data that is relevant to the species’ status. Please refer to Appendix A of the following website for the general life history of the listed species:
http://www.nwr.noaa.gov/1habcon/habweb/habguide/appendix_a_june2001.pdf

The BNF found that the Bear Valley Roads Improvement Project is likely to adversely affect the Snake River spring/summer chinook salmon, steelhead and designated critical habitat identified in Table 1. Based on the life histories of these ESUs, the action agency determined that it is likely that juveniles and adult Snake River chinook, and Snake River steelhead incubating eggs, juvenile, and smolts would be adversely affected by the Bear Valley Roads Improvement Project.

[3]Riparian areas adjacent to a stream provide the following functions: shade, sediment delivery/filtering, nutrient or chemical regulation, streambank stability, and input of large woody debris and fine organic matter.

Table 1. References for additional background on listing status, critical habitat designation, protective regulations, and life history for the ESA-listed and candidate species considered in this consultation.

Species ESU	Status	Critical Habitat Designation	Protective Regulations	Life History
Chinook salmon (*O. Tshawytscha*)				
Snake River spring/summer	Threatened; April 22, 1992; 57 FR 14653	October 25, 1999, 64 FR 57399[4]	July 10, 2000; 65 FR 42422	Matthews and Waples 1991; Healey 1991
Steelhead (*O. mykiss*)				
Snake River Basin	Threatened; August 18, 1997; 62 FR 43937		July 10, 2000; 65 FR 42422	Busby et al. 1996

2.1.2.1 Snake River spring/summer chinook salmon

The BNF has determined that listed Snake River spring/summer chinook salmon occur in the area affected by the proposed action. The present range of spawning and rearing habitat for naturally-spawned ESA listed Snake River spring/summer chinook salmon is primarily limited to the Salmon, Grande Ronde, Imnaha and Tucannon River subbasins. Most adult Snake River spring/summer chinook salmon enter individual subbasins from May through September. Juvenile Snake River spring/summer chinook salmon emerge from spawning gravels from February through June (Perry and Bjornn 1991). Typically, after rearing in their nursery streams for about one year, smolts begin migrating seaward in April and May (Bugert et al. 1990; Cannamela 1992). After reaching the mouth of the Columbia River, spring/summer chinook salmon probably inhabit near-shore areas before beginning their northeast Pacific Ocean migration, which lasts 2 to 3 years. For detailed information on the life history and stock status of Snake River spring/summer chinook salmon, see Matthews and Waples (1991), NOAA's National Marine Fisheries Services (NMFS 1991a), and 56 FR 29542 (June 27, 1991).

The Snake River spring/summer chinook salmon ESU, listed as threatened on April 22, 1992, (67 FR 14653), includes all natural-origin populations in the Tucannon, Grande Ronde, Imnaha, and Salmon Rivers. Some or all of the hatchery-origin fish are also part of the listed ESU including those returning to the Tucannon River, Imnaha, and Grande Ronde hatcheries, and to

[4] This corrects the original designation of December 28, 1993, 58 FR 68543 by excluding areas above Napias Creek Falls, a naturally impassable barrier.

the Sawtooth, Pahsimeroi, and McCall hatcheries on the Salmon River. Critical habitat was designated for Snake River spring/summer chinook salmon on December 28, 1993, (58 FR 68543) and was revised on October 25, 1999 (64 FR 57399).

Bevan et al. (1994) estimated the number of wild adult Snake River spring/summer chinook salmon in the late 1800s to be more than 1.5 million fish annually. By the 1950s, the population had declined to an estimated 125,000 adults. Escapement estimates indicate that the population continued to decline through the 1970s. Redd count data also show that the populations continued to decline through about 1980.

Snake River wild spring/summer chinook salmon runs, as counted at the Lower Granite dam, have dwindled from an average of about 60,000 adults in the early to mid-1960s to a few thousand in recent years. Over the last 10 years (1992-2001), which includes the year of listing (1992), returns of wild/natural fish ranged from 183 in 1994 to 12,475 in 2001 and averaged 3,314. The estimated smolt production capacity of 10 million smolts for rivers in Idaho, coupled with historic smolt to adult return rates of two percent to six percent, indicate Idaho could produce wild/natural runs of 200,000 to 600,000 adults (Fish Passage Center 2002). The recent low numbers are reflected throughout the entire distribution of the chinook salmon subpopulations scattered throughout the Grande Ronde, Imnaha, Tucannon, and Salmon River Basins. Redd counts and estimates of parr and smolt densities at index areas (discussed in Attachment B) generally indicate that fish production is well-below the potential, and continuing to decline.

Even though in 2001 and 2002 there were record returns, numbers are in general very low in comparison to historic levels (Bevan et al. 1994). Average returns of adult Snake River spring/summer chinook salmon (averaging 3,314 over the last ten years) are also low in comparison to interim target species recovery levels of 44,766 for the Snake River Basin (April 4, 2002, Interim Abundance and Productivity Targets for Interior Columbia Basin Salmon and Steelhead Listed under the ESA, NMFS 2002). The low returns amplify the importance that a high level of protection be afforded to each adult chinook salmon, particularly because a very small percentage of salmon survive to the life stage of a returning, spawning adult, and because these fish are in the final stage of realizing their reproductive potential (approximately 2,000 - 4,000 progeny).

NOAA Fisheries estimates that the median population growth rate (lambda) for the Snake River spring/summer chinook ESU as a whole, from 1980-1997, ranges from 0.96, assuming no reproduction by hatchery fish in the wild, to 0.80, assuming that hatchery fish reproduce in the river at the same rate as wild fish (Tables B-2a and B-2b in McClure et al. 2000). The proportion of hatchery fish in the Snake River spring/summer chinook population has been increasing with time; consequently, growth rates for the wild spring/summer chinook population are overestimated unless corrected for hatchery influence. The degree of hatchery influence is unknown. NOAA Fisheries estimated the risk of absolute extinction considering a range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (i.e.,

hatchery effectiveness = 0), the risk of absolute extinction within 100 years is 0.40 for Snake River chinook (Table B-5 in McClure et al. 2000). At the high end, assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100%), the risk of absolute extinction within 100 years is 1.00 (Table B-6 in McClure et al. 2000). Habitat improvements would not
necessarily correspond to increased salmon productivity because myriad other factors can still depress populations, but diminished quality would probably correspond to reduced productivity (Regetz 2003).

2.1.2.2 Snake River steelhead

The BNF has determined that listed Snake River steelhead occur in the area affected by the proposed action. The Snake River steelhead ESU was listed as threatened on August 18, 1997 (62 FR 43937), and protective regulations for Snake River steelhead were issued under section 4(d) of the ESA on July 10, 2000 (65 FR 42422). In listing the Snake River steelhead as threatened, NOAA Fisheries determined that the ESU is not presently in danger of extinction, but is likely to become endangered in the foreseeable future. This is due largely to the declining abundance of natural runs over the past decades. Some of the significant factors in the declining populations are mortality associated with the many dams along the Columbia and Snake Rivers, losses from harvest, loss of access to more than 50% of their historic range, and degradation of habitat used for spawning and rearing. Possible genetic introgression from hatchery stocks is another threat to Snake River steelhead since wild fish comprise a small proportion of the
population. The Middle Fork Salmon River is one of three drainages which sustain steelhead unaltered by hatchery-reared stocks (Thurow 1985). Additional information on the biology, status, and habitat requirements for Snake River steelhead are described in Busby et al. (1996).

Two distinct groups of steelhead (A-run and B-run) occur in the Snake River basin, based on the timing of passage over Bonneville Dam (Busby et al. 1996). Steelhead in the project area are believed to be mostly B-run steelhead. B-run steelhead pass Bonneville Dam after August 25; the geographic distribution of B-run steelhead is restricted to particular watersheds within the Snake River basin (areas of the mainstem Clearwater, Selway, and Lochsa Rivers and the South and Middle Forks of the Salmon River). Genetic data are lacking for steelhead populations in South and Middle Forks of the Salmon River (Kiefer et al. 1992).

Stock status for Snake River steelhead is discussed in Attachment A. In short, the abundance of natural-origin Snake River steelhead counted at the uppermost dam on the Snake River has fluctuated from a 4-year average of 58,300 in 1964, to a 4-year average of 8,300 ending in 1998; the most recent 4-year average (1999-2002) showed an increase, with an estimate of approximate 34,300 natural origin steelhead (Fish Passage Center 2003). In general, steelhead abundance declined sharply in the early 1970s, rebuilt modestly from the mid-1970s through the 1980s, and declined again during the 1990s. Estimates of adult steelhead returning to the action area are not available. Redd counts and estimates of parr and smolt densities at index areas (discussed in Attachment A) generally indicate that fish production is well-below the potential, and below historical numbers.

The Snake River steelhead ESU consists of hatchery fish, considered non-essential for recovery, and wild fish, which form the core population for recovery. Range-wide, wild Snake River steelhead are far below historical numbers, and they comprise less than 20% of the adult returns. Much of the historic habitat is inaccessible due to Hell's Canyon and Dworshak Dams. The biological requirements of Snake River steelhead are currently not being met under the environmental baseline, as indicated by mostly downward trends in numbers of wild adults. Any changes in the environmental baseline in an area as large as the Bear Valley Creek drainage could have a significant impact on steelhead recovery due to the importance of the drainage for steelhead production, and the heightened risk from a declining population trend across the ESU.

The returning numbers of Snake River steelhead have increased since the mid-1970s, however, this increase is mostly the result of hatchery stocks, while wild stocks are slower to recover. Wild fish populations began declining in the mid-1970s and continued through 1998, and then increased from 1999 through 2002 (Fish Passage Center 2001). Current wild populations even with recent increases are still substantially below historic levels, and parr densities in natural production areas are estimated to be below estimated capacity (Hall-Griswold and Petrosky 1996). The slow recovery rate and low parr densities are particularly severe for B-run steelhead, which are the dominant form in the Middle Fork Salmon River drainage.

NOAA Fisheries estimates that the median population growth rate (lambda [λ]) for the Snake River steelhead ESU as a whole, from 1980-1997, ranges from 0.91, assuming no reproduction by hatchery fish in the wild, to 0.70, assuming that hatchery fish reproduce in the river at the same rate as wild fish (Tables B-2a and B-2b in McClure et al. 2000). The proportion of hatchery fish in the Snake River steelhead population has been increasing with time; consequently, growth rates for the wild steelhead population are overestimated unless corrected for hatchery influence. The degree of hatchery influence is unknown; however, there has not been steelhead hatchery stocking in the Middle Fork Salmon River. NOAA Fisheries estimated the risk of absolute extinction for the A- and B-runs, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (i.e., hatchery effectiveness = 0), the risk of absolute extinction within 100 years is 0.01 for A-run steelhead and 0.93 for B-run fish (Table B-5 in McClure et al. 2000). At the high end, assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100%), the risk of absolute extinction within 100 years is 1.00 for both runs (Table B-6 in McClure et al. 2000).

The 2000 and 2001 counts of returning Snake River steelhead at Lower Granite Dam indicate a short-term increase in returning adult spawners. Adult returns (hatchery and wild) in 2001 were the highest in 25 years and 2000 counts were the sixth highest on record (Fish Passage Center 2001). Increased levels of adult returns are likely a result of favorable ocean and instream flow conditions for these cohorts. Although steelhead numbers have dramatically increased, wild steelhead comprise only 10% to 20% of the total returns since 1994. These small percentages continue into the 1999-2001; the wild steelhead percentages increased to 26% for 2002 (Fish Passage Center 2003). The large increase in fish numbers, while encouraging, does not reflect a sustained change in steelhead status. Recent increases in the population are not expected to continue, and the long-term trend for this species indicates a decline. Detailed information on the current range-wide status of Snake River steelhead, under the environmental baseline, is described in a steelhead status review (Busby et al. 1996), status review update (BRT 1997), and the Middle Fork Salmon River 2001 BA (Wagoner 2001).

Survival of downstream migrants in 2001 was the lowest since 1993. Low survival was due to record low run-off volume, and elimination of spills from the Snake River dams to meet hydropower demands (Fish Passage Center 2001). The average downstream travel time for steelhead nearly doubled and was among the highest observed since recording began in 1996. Consequently, wide fluctuations in population numbers are expected over the next few years when adults from recent cohorts return to spawning areas.

Streams in the Bear Valley Creek watershed provide habitat for adult spawning, juvenile rearing, overwintering, and migration (Shapiro and Associates 2000). Watersheds within the action area are tributaries of the Middle Fork Salmon River. The Middle Fork Salmon River is designated a Priority Watershed for steelhead (NMFS 1995). Priority watersheds were identified to protect important habitats and population strongholds of anadromous fish, and are managed to maintain or improve fish habitat. The Middle Fork Salmon River is also designated a Special Emphasis subbasin (NMFS 1998) as it has a genetically and ecologically unique population of steelhead. Juvenile steelhead are more abundant in the tributaries than in the Middle Fork Salmon River; tributaries provide the principal rearing habitat for steelhead in the drainage (Thurow 1985). Steelhead numbers in the Middle Fork Salmon River drainage, including the project area, are dramatically reduced from historic levels due to extensive alteration of fish habitat from past mining, roads, diversions, grazing, and downstream impacts common to all Snake River salmon and steelhead (Shapiro and Associates 2000).

2.1.3 Environmental Baseline in the Action Area

The environmental baseline is defined as: "the past and present impacts of all Federal, state, or private actions and other human activities in the action area, including the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation and the impacts of state and private actions that are contemporaneous with the consultation in progress" (50 CFR 402.02). In step 2, NOAA Fisheries' evaluates the relevance of the environmental baseline in the action area to the species' current status. In describing the environmental baseline, NOAA Fisheries evaluates essential features of designated critical habitat and the listed Pacific salmon ESUs affected by the proposed action.

In general, the environment for listed species in the Columbia River Basin (CRB), including those that migrate past or spawn upstream from the action area, has been dramatically affected by the development and operation of the Federal Columbia River Power System (FCRPS). Storage dams have eliminated mainstem spawning and rearing habitat, and have altered the natural flow regime of the Snake and Columbia Rivers, decreasing spring and summer flows, increasing fall and winter flow, and altering natural thermal patterns. Power operations cause fluctuation in flow levels and river elevations, affecting fish movement through reservoirs, disturbing riparian areas and possibly stranding fish in shallow areas as flows recede. The eight dams in the migration corridor of the Snake and Columbia Rivers kill or injure a portion of the smolts passing through the area. The low velocity movement of water through the reservoirs behind the dams slows the smolts' journey to the ocean and enhances the survival of predatory fish (Independent Scientific Group 1996, National Research Council 1996). Formerly complex mainstem habitats in the Columbia and Snake Rivers have been reduced, for the most part, to single channels, with floodplains reduced in size, and off-channel habitats eliminated or disconnected from the main channel (Sedell and Froggatt 1984; Independent Scientific Group 1996; and Coutant 1999). The amount of large woody debris in these rivers has declined, reducing habitat complexity and altering the rivers' food webs (Maser and Sedell 1994).

Other human activities that have degraded aquatic habitats or affected native fish populations in the CRB include stream channelization, elimination of wetlands, construction of flood control dams and levees, construction of roads (many with impassable culverts), timber harvest, splash dams, mining, water withdrawals, unscreened water diversions, agriculture, livestock grazing, urbanization, outdoor recreation, fire exclusion/suppression, artificial fish propagation, fish harvest, and introduction of non-native species (Henjum *et al.* 1994; Rhodes *et al.* 1994; National Research Council 1996; Spence *et al.* 1996; and Lee et al. 1997). In many watersheds, land management and development activities have: (1) reduced connectivity (i.e., the flow of energy, organisms, and materials) between streams, riparian areas, floodplains, and uplands; (2) elevated fine sediment yields, degrading spawning and rearing habitat; (3) reduced large woody material that traps sediment, stabilizes streambanks, and helps form pools; (4) reduced vegetative canopy that minimizes solar heating of streams; (5) caused streams to become straighter, wider, and shallower, thereby reducing rearing habitat and increasing water temperature fluctuations;
(6) altered peak flow volume and timing, leading to channel changes and potentially altering fish migration behavior; and (7) altered floodplain function, water tables and base flows (Henjum *et al.* 1994; McIntosh *et al.* 1994; Rhodes *et al.* 1994; Wissmar *et al.* 1994; National Research Council 1996; Spence *et al.* 1996; and Lee *et al.* 1997).

To address problems inhibiting salmonid recovery in CRB tributaries, the Federal resource and land management agencies developed the *All H Strategy* (Federal Caucus 2000). Components of the *All H Strategy* commit these agencies to increased coordination and a fast start on protecting and restoring habitat for salmon and steelhead.

Bear Valley Creek drainage is one of five 5th field HUCs that comprise the greater Upper Middle Fork watershed. Bear Valley Creek drainage area comprises about 23% of the Upper Middle Fork watershed. Bear Valley Creek drainage is approximately 342 square miles (122,500 acres) and contains about 393 total stream miles. The drainage is divided into two 5th field HUCs (Elk Creek and Bear Valley) and further divided into seven 6th field HUCs (Bearskin, Cache, Fir Creek, Lower Elk, Upper Bear Valley, Upper Elk, and Wyoming Creeks) (Shapiro and Associates 2000).

The Bear Valley Creek drainage is important for fish resources in the Salmon River Basin because the spring/summer chinook salmon population is one of the few remaining wild runs, with essentially no hatchery influence, along with summer steelhead that are classified as "Wild B-run." The Bear Valley Creek drainage has been classified as a key watershed due to its importance for protecting and restoring bull trout, chinook salmon and steelhead populations. The watershed contains vital spawning, rearing, and migratory habitats for wild Snake River spring/summer chinook salmon and steelhead.

The Bear Valley population of Snake River steelhead occurs in mainstem Bear Valley Creek and Elk Creek. Snake River steelhead are not known to occur in Casner Creek, Cub Creek, or other tributaries to Bear Valley and Elk Creeks. Spawning occurs in April and early May, young emerge from stream gravels between June and August, and most juveniles rear in Bear Valley Creek their first year before beginning downstream migrations toward sea. Incubating steelhead eggs and rearing juveniles are present in Bear Valley Creek during the proposed July 15 – September 15 construction period.

The Bear Valley population of Snake River spring/summer chinook salmon occurs primarily in mainstem Bear Valley and Elk Creeks. Chinook salmon are not known to occur in Casner Creek or Cub Creek, although these and other Bear Valley Creek drainages are designated critical habitat for this species. Spawning occurs during August, young emerge from stream gravels in late winter or spring, and most juveniles rear in Bear Valley and Elk Creeks until late summer or fall before beginning their downstream migrations toward the sea.

The action area includes streams and tributaries where the project may cause changes in sediment input, temporarily block fish passage, or affect water quality that would affect chinook salmon and steelhead habitat in the Bear Valley Creek watershed; see map (Figure 1). Environmental baseline conditions in the action area were evaluated in the BA at the project area (Upper Elk, Lower Elk, Wyoming, Fir, Bearskin, Cache and Upper Bear Valley Creeks 6th field HUCs) using the MPI (NMFS 1996). The MPI provides an assessment tool of the current condition of instream, riparian, and watershed factors that collectively represent habitat components essential for the survival and recovery of the species.

The Bear Valley Creek watershed is considered to be "functioning at risk" when using the MPI for these habitat indicators: temperature (48-59° F), large pool frequency (87.5 per mile), width to depth ratio for the stream channels, and has moderate riparian reserves. Habitat indicators that are considered to be "functioning at unacceptable risk" are: substrate fines (37%), physical barriers (23), and streambank stability (54%). Threatened habitat indicators are stream bank stability, substrate fines, temperature, and large pools. Habitat quality has been degraded by past management activities such as mining, grazing, and road construction (Burton and Vollmer 2000).

Mining has had significant historical impact on the upper mainstem of Bear Valley Creek. Riparian vegetation communities along the mainstem portions of Bear Valley Creek, Elk Creek, and some tributaries were heavily grazed which led to streambank and channel destabilization and elevated bedloads that continue to affect stability. Steelhead and chinook salmon spawning and rearing habitats are mostly associated with the mainstems of Bear Valley and Elk Creeks. Unsurfaced roads occur throughout much of the south half of Bear Valley Creek watershed within the action area. Many of these roads run adjacent to stream channels. Some of these roads are eroded by streams during spring snow melt when water encroaches upon road surfaces (Burton and Volmer 2000).

Studies conducted in Bear Valley have shown that steelhead densities are very low (Thurow 1983). It is believed that one reason for these low numbers is the limited amount of pocket water type rearing habitat (Burton and Volmer 2000). Steelhead have been observed in Bear Valley Creek and Elk Creek for adult migration, staging, spawning, and juvenile rearing. Steelhead juvenile forms have also been observed rearing in Casner and Cub Creeks. Chinook salmon densities are much higher than steelhead. Chinook salmon have been observed in Bear Valley and Elk Creeks for adult migration, staging, and spawning. Juvenile chinook salmon have been observed in Bear Valley and Elk Creeks.

The biological requirements of the listed species are not being met under the environmental baseline. Conditions in the action area would have to improve, and any further degradation of the baseline, or delay in improvement of these conditions would probably further decrease the likelihood of survival and recovery of the listed species under the environmental baseline. Actions need to be taken to increase bank stability, decrease sedimentation of surface fines, increase large pool frequency, and lower the water temperatures for the recovery of chinook salmon and steelhead.

Pacific salmon populations also are substantially affected by variation in the freshwater and marine environments. Ocean conditions are a key factor in the productivity of Pacific salmon populations. Stochastic events in freshwater (flooding, drought, snowpack conditions, volcanic eruptions, etc.) can play an important role in a species' survival and recovery, but those effects tend to be localized compared to the effects associated with the ocean. The survival and recovery of these species depends on their ability to persist through periods of low natural survival due to ocean conditions, climatic conditions, and other conditions outside the action area. Freshwater survival is particularly important during these periods because enough smolts must be produced so that a sufficient number of adults can survive to complete their oceanic migration, return to spawn, and perpetuate the species. Therefore it is important to maintain or restore essential features/PFC in order to sustain the ESU through these periods. Additional details about the importance of freshwater survival to Pacific salmon populations can be found in Federal Caucus (2000), NMFS (2000), and Oregon Progress Board (2000).

2.2 Analysis of Effects

Effects of the action are defined as: "the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with the action, that will be added to the environmental baseline" (50 CFR 402.02). Direct effects occur at the project site and may extend upstream or downstream based on the potential for impairing the value of habitat for meeting the species' biological requirements or impairing the essential features of critical habitat. Indirect effects are defined in 50 CFR 402.02 as "those that are caused by the proposed action and are later in time, but still are reasonably certain to occur." They include the effects on listed species or critical habitat of future activities that are induced by the proposed action and that occur after the action is completed. "Interrelated actions are those that are part of a larger action and depend on the larger action for their justification" (50 CFR 403.02). "Interdependent actions are those that have no independent utility apart from the action under consideration" (50 CFR 402.02).

In step 3 of the jeopardy and adverse modification analysis, NOAA Fisheries evaluates the effects of proposed actions on listed species and seeks to answer the question of whether the species can be expected to survive with an adequate potential for recovery. In watersheds where critical habitat has been designated, NOAA Fisheries must make a separate determination of whether the action will result in the destruction or adverse modification of critical habitat (ESA, section 3, (3) and section 3(5A)).

2.2.1 Habitat Effects (which may also affect listed species)

The Bear Valley Roads Improvement Project BA provides an analysis of the effects of the proposed action on Snake River spring/summer chinook salmon, steelhead, and spring/summer chinook salmon critical habitat in the action area. The analysis uses the MPI and procedures in NMFS (1996), the information in the BA, and the best scientific and commercial data available to evaluate elements of the proposed action that have the potential to affect the listed fish or essential features of their critical habitat.

2.2.1.1. Effects of sedimentation on Snake River spring/summer chinook salmon and steelhead

Potential effects of the Bear Valley Roads Improvement Project on listed fish and their habitats are related to short-term increased sedimentation from road reconstruction, road obliteration, and culvert replacement and removal, which may result in long-term reduction in sediment delivery. When sediment delivery exceeds a stream's sediment transport capabilities, the amount of fine sediments increase on and within stream substrates. Salmonid populations are typically negatively correlated with the amount of fine sediment in stream substrate (Chapman and McLeod 1987). Excessive concentrations of fine sediments in spawning and rearing habitats can reduce survival of embryos and alevins by entombing embryos and reducing flow of dissolved oxygen, decrease the availability of interstitial hiding places, alter production of macroinvertebrates, and reduce total pool volume (various studies summarized in Spence et al. 1996). Egg deposition and survival are reduced when sediment fills the interstitial spaces between gravels and prevents the flow of oxygen and the flushing of metabolic wastes. Fine sediment deposited in stream substrates is directly related to chinook salmon egg-to-fry survival. As fine sediment increases above approximately 19%, chinook salmon egg-to-fry survival declines rapidly (Tappel and Bjornn 1983; Chapman and McLeod 1987; Burton et al. 1993). Rhodes et al. (1994) concluded that survival to emergence for chinook salmon in the Snake River Basin is probably substantially reduced when fine sediment concentrations (< 6.4 mm in size) in spawning gravel exceed 20%. They recommended suspension of ongoing activities and prohibition of new activities where this standard is exceeded.

Emerging fry can also be trapped and smothered by sediment deposition in the gravels. As sediment becomes deposited in interstitial spaces, rearing habitat for juvenile salmonids is also reduced. Rearing areas are diminished as sediment fills pools and other areas. Sedimentation of deep pools and coarse substrate used for rearing and overwintering limits the space available for fish. Increased sediment load can be detrimental to juvenile salmon not only by causing siltation, but also by introducing suspended particulate matter that interferes with feeding and territorial behavior (Berg and Northcote 1985). Newly emerged fry appear to be more susceptible to even moderate turbidity than older fish. Turbidity in the 25-50 nephalometric turbidity units (NTU) range (equivalent to 125-275 mg/L of bentonite clay) reduced growth and caused more young salmon and steelhead to emigrate from laboratory streams than did clear water (Sigler, et al. 1984).

Sedimentation can negatively affect invertebrates, resulting in a reduction of the food supply for salmon and steelhead. Potential effects of sedimentation on benthic macroinvertebrates include interference with respiration and the overwhelming of filtering insects such as some caddisfly larvae that employ fine-meshed catchnets for obtaining drifting food particles. However, the major effect upon benthic invertebrates is the massive smothering of physical habitat by heavy sediment deposition on the stream-bed, including the loss of interstitial space occupied by burrowing or hyporheic animals (Waters 1995).

Culvert replacements require instream work that involves a sequence of constructing a temporary barrier to exclude fish from the work area, snorkel surveys and the use of either or both block nets and electro-shocking in order to capture or drive fish out of the in-stream work area, temporary diversion of water, removal of existing culverts, installation of new culverts, removal of the temporary diversions, reshaping the fill, and seeding, mulching and planting bare soils. The effects related to sediment delivery from this in-channel work are discussed here. Other effects (e.g. related to electro-shocking) will be discussed in section 2.1.1.3 below.

Excavation and replacement of road fills and stream channel materials are likely to temporarily increase stream turbidity and sedimentation, and rearrange substrate materials. Based on the Hydrology and Soils Analysis (CH2M HILL 2003b) each culvert replacement could produce a short term input of 0.10 tons of sediment. Turbidity created from the culvert replacements could temporarily diminish juvenile salmonid feeding downstream. Increased turbidity and sediment levels are likely to exceed the natural background levels during construction in each stream when water is returned to the main channel after culvert replacement. A short-term pulse of sediment is expected to occur after culvert replacement. The primary effect of increased turbidity on salmonids is diminished feeding efficiency. Fish affected by turbidity may temporarily or permanently leave the area to avoid its effects. Mortality or harm from turbidity is not expected to occur because the extent of turbid flows is likely to be short-lived and localized.

Similarly, effects from road reconstruction/rehabilitation would be limited to temporary, localized increases in sediment delivery to Bear Valley Creek and Elk Creek. Analyses presented in the Hydrology and Soils Specialist Report indicate that during construction localized sediment delivery would increase by 10 to 30 percent at each site for a few days, depending on the nature of the site and construction activity.

Instream work conducted after August 15 has a greater potential impact upon spawning chinook salmon and their redds through displacement of fish and sedimentation. Possible downstream effects of the activities are likely to occur within Elk Creek and Bear Valley Creek, where important spawning areas are located. While instream work is expected to create turbidity that will have a short-lived, non-lethal effect on juvenile fish, NOAA Fisheries also considered potential downstream effects on spawning fish and redds. The areas where spawning fish and redds might be adversely affected are those downstream from the Cub or Casner Creek culvert replacement sites. Spawning salmon and redds are not expected to occur in Cub or Casner Creeks due to the small size of these creeks and the absence of suitable spawning substrate for chinook salmon (NOAA Fisheries site reconnaissance, September 3, 2003; Debbie Artimez and Bill Lind). Spawning fish and redds are likely to occur in mainstem of Bear Valley Creek below the Cub and Casner Creek culverts; however, because of the expected short term duration of the turbidity, limited stream energy in Cub and Casner Creeks, and substantially greater flows in Bear Valley Creek during the work window, effects on spawning fish and redds are expected to be minimal. Regarding road reconstruction and rehabilitation, these activities do not involve instream work; and erosion control measures and timing are expected to be effective in avoiding/greatly minimizing sediment delivery directly into Bear Valley and Elk Creeks during the spawning time period.

Analyses in the Hydrology and Soils Specialist Report (CH2M HILL 2003b) indicate there would be a long-term 50 to 60 percent reduction in sediment delivery to those reaches of Bear Valley Creek and

Elk Creek that are adjacent to and currently being impacted by sediment loading at the road reconstruction and relocation sites. Hydrologic function will be increased by reducing the probability of culvert failures and by re-establishing more natural patterns of bedload and woody debris movement. The new culverts would be sized to pass a 100-year flood and are designed to allow channel materials to deposit on the bottom of the culvert. The physical changes will remove or reduce migration impediments to steelhead, chinook salmon and other aquatic organisms.

Based on the effects described above, the proposed actions will have short-term adverse effects and a long-term beneficial effect on steelhead and chinook habitat in the action area. The production capacity of both steelhead and chinook salmon is expected to increase in the action area as a result of the proposed action. However, changes in the lambda, as a result of the restoration activities, cannot be quantified since the expected incremental change in egg-to-smolt survival in the action area is unknown.

2.2.1.2. Effects of chemical contamination on Snake River spring/summer chinook salmon and steelhead

As with all construction activities, accidental release of fuel, oil, and other contaminants may occur. Operation of the backhoes, excavators, and other equipment requires the use of fuel, lubricants, etc., which, if spilled into a waterbody or into the adjacent riparian zone, can injure or kill aquatic organisms. Petroleum-based contaminants (such as fuel, oil, and some hydraulic fluids) contain poly-cyclic aromatic hydrocarbons (PAHs), which can be acutely toxic to salmonids at high levels of exposure and can also cause chronic lethal and acute and chronic sublethal effects to aquatic organisms (Neff 1985). Excavation in the stream channel associated with the culvert work will elevate the risk for chemical contamination of the aquatic environment within the action area. Because the potential for chemical contamination should be localized and brief, the probability of direct mortality is negligible. In-water work period of July 15 through September 15, work area isolation, and fish removal and relocation will be employed as necessary, depending on presence of fish and/or flowing water to minimize the risk from chemical contamination during in-water work activities. In addition, the Forest Service will be required to develop and monitor a site specific pollution control plan for the contractor to implement in an effort to further minimize risk to the aquatic environment.

2.2.1.3. Effects of instream work and fish passage on Snake River spring/summer chinook salmon and steelhead

Potential upstream passage by juvenile chinook salmon and steelhead would be blocked for approximately 7 days for Casner Creek culvert replacement, 1 day for the removal of the 5 small culverts on Casner Creek, and 6 days for the Cub Creek culvert replacement (14 days total). Data and site visits suggest that chinook salmon likely do not spawn in either creek. Juvenile fish passage which are currently assumed to be blocked by the two culverts being replaced will continue to be blocked until culvert work is complete. In subsequent years, there will be no barriers to potential upstream chinook salmon movements above culvert replacement sites (CH2MHILL 2003a). The proposed project would improve access for chinook salmon and steelhead in the Bear Valley Creek watershed. Access to upper Casner and Cub Creeks would be possible year-round.

There is the possibility that instream work activities could kill juvenile chinook salmon or steelhead. The BNF will set up block nets, snorkel and direct fish away from de-watered work areas to reduce the potential for harming listed fish. Electro-shocking to capture fish may be used as a final step (after sweep through with block nets and snorkeling) in order to remove fish from the in-stream work area. Some juvenile fish may be killed if electro-shocking is used to relocate these fish; however this mortality is expected to be very small as few fish are expected to be present after block netting and snorkeling are complete. The BNF will implement proven electro-shocking techniques to minimize fish mortality.

2.2.1.4. Effects of riparian vegetation and stream temperature on Snake River spring/summer chinook salmon and steelhead

Woody riparian vegetation provides large wood to the stream, which encourages the creation of rearing and spawning areas. Riparian vegetation also provides water quality functions (*e.g.* temperature control and nutrient transformation), bank stability, detritus (insect and leaf input, small wood for substrate for insects), microclimate formation, floodplain sediment retention and vegetative filtering, and recharge of the stream hyporheic zone.

A long-term benefit to chinook salmon and steelhead would result from the establishment of streamside and upland vegetation along the 0.3-mile-long road rehabilitation segment adjacent to Bear Valley Creek. Streamside vegetation benefits to aquatic communities can include overhanging cover and shade, cool water temperature, large woody debris recruitment leading to increased instream cover and water depth, increased bank stability and complexity, buffer and filter for erosion control and reduced sediment delivery, and a source of terrestrial food items for fish.

2.2.2 Species Effects

The effect that a proposed action has on particular essential habitat features or Matrix pathways can be translated into an effect on population growth rate (lambda [λ]). In the case of this consultation it is not possible to quantify an incremental change in survival for Snake River spring/summer chinook salmon, and Snake River steelhead.

While essential habitat features were discussed within the action area, the existing population growth rates have been calculated at the much larger ESU scale. An action that improves habitat in a watershed, and thus helps meet essential habitat feature requirements, may therefore increase lambda (λ) for Snake River steelhead and Snake River spring/summer chinook salmon.

Adverse effects on individual fish can reduce population recruitment rates of Snake River spring/summer chinook salmon and Snake River steelhead by a small increment. The short term adverse effects of the project will likely be minimized through the extensive mitigation measures. However, the potential for adverse effects on these populations remains a concern. The genetically unique steelhead population in the Middle Fork Salmon River subbasin, and the spring/summer chinook salmon population, currently are well below their historic abundances and well below interim targets for recovery, as noted above. Therefore, even small incremental reductions in these populations can reduce the likelihood of their survival over the long-term.

As described in the effects discussion above, the Bear Valley Roads Improvement Project will have short-term negative effects on salmon and steelhead due to sedimentation, displacement of juvenile fish due to snorkeling and the use of block nets, possible fish kill of electro-shocking, and blockage of fish passage; however the project will have long-term positive effects on the survival and recovery of Snake River spring/summer chinook salmon and Snake River steelhead by replacing culverts that are fish barriers and relocating roads that are contributing sediment into streams.

2.2.3 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." These activities within the action area also have the potential to adversely affect the listed species and critical habitat. Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being reviewed through separate section 7 consultation processes. Federal actions that have already undergone section 7 consultations have been added to the description of the environmental baseline in the action area.

State, tribal, and local government actions will likely be in the form of legislation, administrative rules or policy initiatives. Government and private actions may encompass changes in land and water uses–including ownership and intensity–any of which could adversely affect listed species or their habitat. Government actions are subject to political, legislative, and fiscal uncertainties.

Changes in the economy have occurred in the last 15 years, and are likely to continue, with less large-scale resource extraction, more targeted extraction, and significant growth in other economic sectors. Growth in new businesses, primarily in the technology sector, is creating urbanization pressures and increased demands for buildable land, electricity, water supplies, waste-disposal sites, and other infrastructure.

Economic diversification has contributed to population growth and movement, and this trend is likely to continue. Such population trends will result in greater overall and localized demands for electricity, water, and buildable land in the action area; will affect water quality directly and indirectly; and will increase the need for transportation, communication, and other infrastructure. The impacts associated with these economic and population demands will probably affect habitat features such as water quality and quantity, which are important to the survival and recovery of the listed species. The overall effect will likely be negative, unless carefully planned for and mitigated.

Effects of non-Federal actions are probably insignificant for steelhead and chinook salmon in the action area watershed because State and private lands are absent. Non-Federal actions are mostly confined to State and Tribal activity within boundaries of the BNF (Burton and Vollmer 2000).

NOAA Fisheries is not aware of any new non-Federal activities that are reasonably certain to occur in the action area. There are, however, ongoing activities that are expected to continue to occur at current levels, or in some cases, increased levels. Ongoing actions include: (1) recreational use, (2) hunting, (3) dispersed camping, and (4) outfitter and guide services (Shapiro and Associates 2000).

The Idaho Department of Environmental Quality will establish total maximum daily loads (TMDLs) in the Snake River basin, a program regarded as having positive water quality effects. The TMDLs are required by court order, so it is reasonably certain that they will be set. The State of Idaho has created an Office of Species Conservation to work on subbasin planning and to coordinate the efforts of all state offices addressing natural resource issues. Demands for Idaho's groundwater resources have caused groundwater levels to drop and reduced flow in springs for which there are senior water rights. The Idaho Department of Water Resources has begun studies and promulgated rules that address water right conflicts and demands on a limited resource. The studies have identified aquifer recharge as a mitigation measure with the potential to affect the quantity of water in certain streams, particularly those essential to listed species.

2.2.4 Consistency with Listed Species ESA Recovery Strategies

Recovery is defined by National Marine Fisheries Service (NMFS) regulations (50 CFR 402) as an "improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in section 4 (a)(1) of the Act." Recovery planning is underway for listed Pacific salmon in the Northwest with technical recovery teams identified for each domain. Recovery planning will help identify measures to conserve listed species and increase the survival of each life stage. NOAA Fisheries also intends that recovery planning identify the areas/stocks most critical to species conservation and recovery and thereby evaluate proposed actions on the basis of their effects on those areas/stocks.

Until the species-specific recovery plans are developed, the FCRPS Opinion and the related December 2000 *Memorandum of Understanding Among Federal Agencies Concerning the Conservation of Threatened and Endangered Fish Species in the Columbia River Basin* (together these are referred to as the Basinwide Salmon Recovery Strategy) provides the best guidance for judging the significance of an individual action relative to the species-level biological requirements. In the absence of completed recovery plans, NOAA Fisheries strives to ascribe the appropriate significance to actions to the extent available information allows. Where information is not available on the recovery needs of the species, either through recovery planning or otherwise, NOAA Fisheries applies a conservative substitute.

The BNF has specific commitments to uphold under the Basinwide Salmon Recovery Strategy. For Federal lands, PACFISH, the Northwest Forest Plan, and land management plans and associated biological opinions define these commitments. Relevant commitments from the Basinwide Salmon Recovery Strategy are described below.

A. Ensure that land managers consider the broad landscape context of site-specific decisions on management activities by requiring a hierarchically-linked approach to analysis at different geographic scales. This is important to ensuring that the type, location and sequencing of activities within a watershed are appropriate and done in the context of cumulative effects and broad scale issues, risks, opportunities and conditions.

B. Cooperate with similar basin planning processes sponsored by the Northwest Power Planning Council, BPA and other federal agencies, states and tribes to identify habitat restoration opportunities and priorities.

C. Consult with NOAA Fisheries on land management plans and actions that may affect listed fish species following the Streamlined Consultation Procedures for section 7 of the ESA, July, 1999.

D. Collaborate early and frequently with states, tribes, local governments and advisory councils in land management analyses and decisions.

E. Cooperate with the other Federal agencies (in particular NOAA Fisheries and USFWS), states and tribes in the development of recovery plans and conservation strategies for listed and proposed fish species. Require that land management plans and activities be consistent with approved recovery plans and conservation strategies.

F. Collaborate with other federal agencies, states and tribes to improve integrated application of agency budgets to maximize efficient use of funds towards high priority restoration efforts on both federal and non-federal lands.

G. Collaborate with other federal agencies, states and tribes in monitoring efforts to assess if habitat performance measures and standards are being met.

H. Require that land management decisions be made as part of an ongoing process of planning, implementation, monitoring and evaluation. Incorporate new knowledge into management through adaptive management.

The proposed action is consistent with the specific commitments and primary objectives of the Basinwide Salmon Recovery Strategy.

2.3 Conclusions

2.3.1 Species Conclusion

NOAA Fisheries has determined that, based on the available information, the proposed action is not likely to jeopardize the continued existence Snake River steelhead and Snake River spring/summer chinook salmon. NOAA Fisheries used the best available scientific and commercial data to analyze the effects of the proposed action on the biological requirements of the species relative to the environmental baseline, together with cumulative effects. NOAA Fisheries applied its evaluation methodology to the proposed action and found that it could cause minor, short-term degradation of anadromous salmonid habitat, temporary blockage of streams, harassment of juveniles from snorkeling or possible kill from electro-shocking, and increases in sedimentation, and turbidity. NOAA Fisheries expects that construction-related effects and work isolation activities could temporarily alter normal feeding and sheltering behavior of juvenile steelhead, or chinook salmon during the proposed action. NOAA Fisheries expects some direct or delayed mortality of juvenile steelhead, or chinook salmon as a result of in-stream activities should chinook or steelhead be present in those areas during the proposed action. NOAA Fisheries expects beneficial water quality and hydrologic effects from the replacement of the Cub and Casner Creeks culverts, and relocating and reconstructing segments of FS Road 579 and FS Road 582 further from stream channels. NOAA Fisheries expects long-term, beneficial effects on the species from improved fish passage and hydraulic conditions as a result of the culvert replacements.

NOAA Fisheries' conclusions are based on the following considerations: (1) Most of the proposed work will occur outside of the flowing waters of Cub and Casner Creeks (*i.e.*, in the dry); (2) in-water work will occur July 15 through September 15 during dry weather and low water in Bear Valley streams; (3) any increases in sedimentation and turbidity in the project reach of Cub and Casner Creeks will be short-term and minor in scale, and would not change or worsen existing conditions for stream substrate in the action area; (4) fish will be removed form the in-stream work area through the use of snorkeling, block nets and possible electro-shocking; (5) long-term, beneficial effects will result from the proposed replacement of the two culverts; and (6) the proposed action is not likely to impair properly functioning habitat, appreciably reduce the functioning of already impaired habitat, or retard the long-term progress of impaired habitat toward proper functioning condition essential to long-term survival and recovery at the population ESU scale.

2.3.2 Critical Habitat Conclusion

After reviewing the current condition of the critical habitat, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects in the action area, it is NOAA Fisheries' opinion that the Bear Valley Roads Improvement Project is not likely to destroy or adversely modify critical habitat for Snake River spring/summer chinook salmon. The effects on the habitat are summarized above, as these also affect the species.

2.4 Conservation Recommendations

Conservation recommendations are defined as "discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information" (50 CFR 402.02). Section 7 (a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. NOAA Fisheries worked with the BNF, prior to formal consultation, to incorporate measures to avoid or minimize adverse effects of the proposed activities. Therefore, NOAA Fisheries has no additional conservation recommendations regarding the actions addressed in this Opinion.

2.5 Reinitiation of Consultation

As provided in 50 CFR 402.16, reinitiation of formal consultation is required if: (1) The amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; (2) new information reveals effects of the action may affect listed species in a way not previously considered; (3) the action is modified in a way that causes an effect on listed species that was not previously considered; or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease, pending conclusion of the reinitiated consultation.

2.6 Incidental Take Statement

The ESA at section 9 [16 USC 1538] prohibits take of endangered species. The prohibition of take is extended to threatened anadromous salmonids by section 4(d) rule [50 CFR 223.203]. Take is defined by the statue as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt to engage in any such conduct." [16 USC 1532 (19)] Harm is defined by regulation as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavior patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering." [50 CFR 222.102] Harass is defined as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering." [50 CFR 17.3]

Incidental take is defined as "any taking otherwise prohibited, if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." [50 CFR 17.3] The ESA at section 7(o)(2) removes the prohibition from any incidental taking that is in compliance with the terms and conditions specified in a section 7(b)(4) incidental take statement.

2.6.1 Amount or Extent of Take

The proposed action is reasonably certain to result in incidental take of the listed species. NOAA Fisheries is reasonably certain the incidental take described here will occur because: (1) the listed species are known to occur in the action area; (2) the proposed action is likely to cause impacts to critical habitat significant enough to impair feeding, breeding, migrating, or sheltering for the listed species; and (3) the proposed action includes in-stream work activities that could harm or kill juvenile chinook salmon or steelhead through the use of snorkeling, block nets, and the possible use of electro-shocking.

Effects of actions such as sedimentation and minor riparian disturbance are unquantifiable in the short-term, and are not expected to be measurable. Take is not anticipated for actions such as road reconstruction, and decommissioning due to mitigation measures built into the BA. Despite the use of best scientific and commercial data available, NOAA Fisheries cannot quantify a specific amount of incidental take of individual fish or incubating eggs for culvert removal and replacements. Instead, the extent of take is anticipated to include the aquatic and associated riparian habitats affected by the actions, extending upstream to the edge of disturbance, and one mile downstream of the confluence of Elk Creek and Bear Valley Creek. If the proposed action results in a greater extent of take, the BNF must reinitiate consultation. The authorized take includes only take caused by the proposed action within the action area as defined in this Opinion.

2.6.2 Reasonable and Prudent Measures

Reasonable and Prudent Measures are non-discretionary measures to minimize take, that may or may not already be part of the description of the proposed action. They must be implemented as binding conditions for the exemption in section 7(o)(2) to apply. The BNF has the continuing duty to regulate the activities covered in this incidental take statement. If the BNF fails to require the applicants to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, or fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. NOAA Fisheries believes that activities carried out in a manner consistent with these reasonable and prudent measures will not necessitate further site-specific consultation. Activities which do not comply with all relevant reasonable and prudent measures will require further consultation.

NOAA Fisheries believes that the following reasonable and prudent measures are necessary and appropriate to minimize take of listed fish resulting from implementation of the action. These reasonable and prudent measures would also minimize adverse effects on designated critical habitat.

The BNF shall:

1. Minimize take resulting from activities proposed in the project such as adverse effects of construction activities and in-channel disturbance on spawning adult chinook salmon, eggs, pre-emergent fry, and rearing steelhead and chinook salmon juveniles.

2. Minimize the impact of incidental take from in-water work activities by ensuring that the in-water work activities (culvert removal and replacement) are isolated from flowing water.

3. Minimize incidental take resulting from fuels and chemical contamination.

4. Monitor the effects of the proposed action to determine the actual project effects on listed fish (50 CFR 402.14 (i)(3)). Monitoring should detect adverse effects of the proposed action, assess the actual extent of incidental take, and detect circumstances where authorized incidental take is exceeded.

5. Minimize incidental take by conducting snorkel surveys, use of block nets, and electro-shocking to remove steelhead and chinook from the in-stream work area.

2.6.3 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the action must be implemented in compliance with the following terms and conditions, which implement the reasonable and prudent measures described above for each category of activity. These terms and conditions are non-discretionary.

1. To implement Reasonable and Prudent Measure 1- minimize the impact of incidental take resulting from activities proposed in the project such as adverse effects of construction activities and in-channel disturbance, the BNF shall:

   a. Prepare project sites in the following manner, including removal of stream materials, topsoil, surface vegetation and major root systems:

      (1) Any instream large wood or riparian vegetation moved or altered during construction will stay on the site or be replaced with a functional equivalent.

      (2) Minimize disturbance and loss of native riparian vegetation.

      (3) Tree or riparian shrub removal occurring at in-channel treatment and stream crossing improvement work sites will be mitigated for onsite by a 2:1 replanting ratio.

      (4) Whenever a project area is to be revegetated or restored, native channel material, topsoil and native vegetation removed for a project should be stockpiled for redistribution on that project area.

   b. Place erosion control methods to reduce sedimentation:

      (1) A supply of erosion control materials (e.g., silt fencing, straw bales) must be on hand to respond to anticipated and unanticipated sources of sediment delivery to streams.

      (2) All temporary erosion controls are in place and appropriately installed downslope of the project activities within the riparian area prior to and during all project activities. Effective erosion control measures will be in place during the proposed activities, and will remain and be maintained until permanent erosion control measures are effective.

   c. Complete earthwork (including instream work) in the following manner:

(1) Channel material and topsoil that cannot be used for restoration efforts will be placed in an upland location where it cannot enter streams or other waterbodies.

(2) All exposed or disturbed areas will be stabilized to prevent erosion, and replanted with native vegetation.

(a) Areas of bare soil within 150 feet of waterways, wetlands or other sensitive areas will be stabilized by native seeding, mulching, and placement of erosion control blankets and mats, if applicable, as quickly after exposure as possible.

(b) All other areas will be stabilized as quickly as feasible, and within 14 days of exposure.

(c) Seeding will occur within the growing season.

(3) Sediment will be removed from sediment controls once it has reached approximately 1/3 of the exposed height of the control.

d. Conduct restoration and site cleanup, including protection of bare earth by seeding, planting, mulching and fertilizing, is done in the following manner:

(1) All areas disturbed by the construction activities will be restored to pre-work conditions.

(2) All exposed soil surfaces will be stabilized at finished grade with native herbaceous seeding, and native woody vegetation as soon as possible during the appropriate planting season (immediately for seeding and the following fall or spring for woody plantings).

(3) Disturbed areas will be planted with native vegetation specific to the project vicinity or the region where the project occurs.

2. To implement Reasonable and Prudent Measure 2 - minimize the impact of incidental take from in-water work activities (culvert removal and replacement), the BNF shall:

a. Divert stream flow around culvert removal/replacement sites through temporary culvert, or a trench lined with plastic, rocks, or other suitable material that prevents soil erosion.

b. Limit construction activities in the stream to the minimum area necessary to complete the project activities.

3. To implement Reasonable and Prudent Measure 3 - minimize the impact of incidental take resulting from fuels and chemical contamination, the BNF shall:

a. Restrict heavy equipment use as follows:

(1) All construction and instream equipment is required to be clean prior to arrival at the construction site(s) to prevent the spread of noxious weeds and to prevent contamination of the stream by petroleum products. Prior to initial and subsequent move-ins, the contractor shall make equipment available for inspection at an agreed location so that untreated wash and rinse water will not be discharged into streams and rivers.

(2) All vehicles operating within riparian habitat conservation area (RHCAs) of any stream or water body will be inspected daily for fluid leaks, and any leaks will be repaired if detected before leaving the vehicle staging area.

(3) When vehicles are not in use, they will be stored in the vehicle staging areas outside of RHCAs. If relocating heavy equipment to staging areas will create additional riparian disturbance, staging in RHCAs can occur after coordinating with a USFS fisheries biologist.

4. To implement Reasonable and Prudent Measure 4 - monitor the effects of the proposed action to determine the actual project effects on listed fish, the BNF shall:

a. Monitor construction activities to ensure proper implementation of the project to minimize take of steelhead and/or chinook salmon.

b. Inspect all erosion control devices during construction to ensure that they are working adequately.

(1) Erosion control devices will be routinely inspected to ensure proper function.

(2) If inspection shows that the erosion controls are ineffective, work crews will be mobilized immediately, to make repairs, install replacements, or install additional controls as necessary.

(3) A Forest Service employee or a Contracting Officer will limit the amount of disturbed area to that which can be adequately controlled. If soil erosion and sediment resulting from construction activities is not effectively controlled, work will cease until protective measures can be implemented.

c. Monitor the success of plantings and revegetation on at least three occasions (e. g. one month, six months, and one year), or more often if necessary, after completion of the project.

d. Submit before each operating season an annual monitoring report, to: NOAA Fisheries, Idaho Habitat Branch, 10215 West Emerald, Suite 180, Boise, Idaho 83704, and/or present an overview of the project's results to NOAA Fisheries during a scheduled Level One Meeting.

e. If a dead, injured, or sick Snake River steelhead and/or Snake River spring/summer chinook salmon specimen is found, initial notification must be made to:

NOAA Fisheries Law Enforcement Office
Idaho Field Office
10215 West Emerald, Suite 180
Boise, Idaho 83704
phone: 208-321-2956

5. To implement Reasonable and Prudent Measure 5 - minimize the impact of incidental take resulting from snorkel surveys, block nets and electro-shocking, the BNF shall:

a. Snorkel surveys and the use of block nets shall be conducted first in order to remove steelhead and chinook from the in-stream work area. If removal of fish through this method is not successful, the use of electro-shocking may be used.

b. Electro-shocking passes over the in-stream work area will be minimized to only what is necessary in order to remove fish.

c. Conduct electro-shocking according to guidelines developed by NOAA Fisheries (NMFS 1998) and included as Appendix C.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

3.1 Statutory Requirements

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan.

Pursuant to the MSA:

Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (section 305(b)(2)).

NOAA Fisheries must provide conservation recommendations for any Federal or state action that may adversely affect EFH (section 305(b)(4)(A));

The EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA section 3). For the purpose of interpreting this definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

The EFH consultation with NOAA Fisheries is required for any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action may adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects on EFH.

3.2 Identification of EFH

Pursuant to the MSA the Pacific Fishery Management Council has designated EFH for three species of Federally-managed Pacific salmon: chinook (*Oncorhynchus tshawytscha*); coho (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*)(PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (i.e., natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in
Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based, in part, on this information.

3.3 Proposed Actions

The proposed action and action area are detailed above in Sections 1.2 and 1.3 of this document. The action area includes habitats that have been designated as EFH for various life-history stages of chinook salmon.

3.4 Effects of Proposed Action on EFH

The effects on chinook salmon EFH are the same as those for ESA listed species and are described in detail in Section 2.2.2 of this document, the proposed action may result in short adverse effects on a variety of habitat parameters. The primary habitat effects are short-term increases in turbidity and sedimentation, and long-term improvements in fish passage. These effects would extend downstream to stream reaches used by chinook salmon.

3.5 Conclusion

NOAA Fisheries concludes that the proposed action may adversely affect designated EFH for chinook salmon.

3.6 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations for any Federal or state agency action that would adversely affect

EFH. In addition to conservation measures proposed for the project by the BNF, all of the reasonable and prudent measures and the terms and conditions contained in sections 2.7.3 and 2.7.4, respectively, of the ESA portion of this Opinion are applicable to salmon EFH. Therefore, NOAA Fisheries incorporates each of those measures here as EFH conservation recommendations.

3.7 Statutory Response Requirement

Pursuant to the MSA (section 305(b)(4)(B)) and 50 CFR 600.920(j), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.8 Supplemental Consultation

The BNF must reinitiate EFH consultation with NOAA Fisheries if either the action is substantially revised or new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920).

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APPENDIX A

BIOLOGICAL REQUIREMENTS, CURRENT STATUS, AND TRENDS:

SNAKE RIVER STEELHEAD

1.1 General Life History

Steelhead can be divided into two basic run-types based on the state of sexual maturity at the time of river entry and the duration of the spawning migration (Burgner et al. 1992). The stream-maturing type, or summer steelhead, enters fresh water in a sexually immature condition and requires several months in freshwater to mature and spawn. The ocean-maturing type, or winter steelhead, enters fresh water with well-developed gonads and spawns shortly after river entry (Barnhart 1986). Variations in migration timing exist between populations. Some river basins have both summer and winter steelhead, while others only have one run-type.

In the Pacific Northwest, summer steelhead enter fresh water between May and October (Busby et al. 1996; Nickelson et al. 1992). During summer and fall, prior to spawning, they hold in cool, deep pools (Nickelson et al. 1992). They migrate inland toward spawning areas, overwinter in the larger rivers, resume migration in early spring to natal streams, and then spawn (Meehan and Bjornn 1991; Nickelson et al. 1992). Winter steelhead enter fresh water between November and April (Busby et al. 1996; Nickelson et al. 1992), migrate to spawning areas, and then spawn in late winter or spring. Some adults, however, do not enter coastal streams until spring, just before spawning (Meehan and Bjornn 1991). Difficult field conditions (snowmelt and high stream flows) and the remoteness of spawning grounds contribute to the relative lack of specific information on steelhead spawning.

Steelhead are iteroparous, or capable of spawning more than once before death. However, it is rare for steelhead to spawn more than twice before dying and most that do so are females (Nickelson et al. 1992). Iteroparity is more common among southern steelhead populations than northern populations (Busby et al. 1996). Multiple spawnings for steelhead range from 3% to 20% of runs in Oregon coastal streams.

Steelhead spawn in cool, clear streams containing suitable gravel size, depth, and current velocity. Intermittent streams may also be used for spawning (Barnhart 1986; Everest 1973). Steelhead enter streams and arrive at spawning grounds weeks or even months before they spawn and are vulnerable to disturbance and predation. Cover, in the form of overhanging vegetation, undercut banks, submerged vegetation, submerged objects such as logs and rocks, floating debris, deep water, turbulence, and turbidity (Giger 1973) are required to reduce disturbance and predation of spawning steelhead. Summer steelhead usually spawn further upstream than winter steelhead (Withler 1966; Behnke 1992).

Depending on water temperature, steelhead eggs may incubate for 1.5 to 4 months (August 9, 1996, 61 FR 41542) before hatching. Summer rearing takes place primarily in the faster parts of pools, although young-of-the-year are abundant in glides and riffles. Winter rearing occurs more uniformly at lower densities across a wide range of fast and slow habitat types. Productive steelhead habitat is characterized by complexity, primarily in the form of large and small wood. Some older juveniles move downstream to rear in larger tributaries and mainstem rivers (Nickelson et al. 1992).

Juveniles rear in fresh water from 1 to 4 years, then migrate to the ocean as smolts. Winter steelhead populations generally smolt after 2 years in fresh water (Busby et al. 1996). Steelhead typically reside in marine waters for 2 or 3 years prior to returning to their natal stream to spawn at 4 or 5 years of age. Populations in Oregon and California have higher frequencies of age-1-ocean steelhead than populations to the north, but age-2-ocean steelhead generally remain dominant (Busby et al. 1996). Age structure appears to be similar to other west coast steelhead, dominated by 4-year-old spawners (Busby et al. 1996).

Based on purse seine catches, juvenile steelhead tend to migrate directly offshore during their first summer rather than migrating along the coastal belt as do salmon. During fall and winter, juveniles move southward and eastward (Hartt and Dell 1986).

1.2 Population Dynamics and Distribution

The following section provides specific information on the distribution and population structure (size, variability, and trends of the stocks or populations) of the Snake River ESU. Most of this information comes from observations made in terminal, freshwater areas, which may be distinct from the action area. This focus is appropriate because the species status and distribution can only be measured at this level of detail as adults return to spawn.

The longest consistent indicator of steelhead abundance in the Snake River Basin is based on counts of natural-origin steelhead at the uppermost dam on the lower Snake River (Lower Granite Dam). The abundance of natural-origin summer steelhead at the uppermost dam on the Snake River has declined from a 4-year average of 58,300 in 1964 to an average of 8,300 ending in 1998. In general, steelhead abundance declined sharply in the early 1970s, rebuilt modestly from the mid-1970s through the 1980s, and again declined during the 1990s (Figure 1).

These broad scale trends in the abundance of steelhead were reviewed through the Plan for analyzing and testing hypotheses (PATH) process. The PATH report concluded that the initial, substantial decline coincided with the declining trend in downstream passage survival. However, the more recent decline in abundance, observed over the last decade or more, does not coincide with declining passage survival, but can be at least partially accounted for by a shift in climatic regimes that has affected ocean survival (Marmorek and Peters 1998).

B-run steelhead are distinguished from the A-run component by their unique life history characteristics. B-run steelhead were traditionally distinguished as larger and older, later-timed fish that return primarily to the South Fork Salmon, Middle Fork Salmon, Selway, and Lochsa rivers. The recent All Species Review by the Technical Advisory Committee (TAC) concluded that different populations of steelhead do have different size structures, with populations dominated by larger fish (i.e., greater than 77.5 cm) occurring in the traditionally defined B-run basins (TAC 1999). Larger fish occur in other populations throughout the basin, but at much lower rates (evidence suggests that fish returning to the Middle Fork Salmon and Little Salmon are intermediate in that they have a more equal distribution of large and small fish).

B-run steelhead are also generally older. A-run steelhead are predominately age-1-ocean fish, whereas most B-run steelhead generally spend two or more years in the ocean prior to spawning. The differences in ocean age are primarily responsible for the differences in the size of A- and B-run steelhead. However, B-run steelhead are also thought to be larger at the same age than A-run fish. This may be due, in part, to the fact that B-run steelhead leave the ocean later in the year than A-run steelhead and thus have an extra month or more of ocean residence at a time when growth rates are thought to be greatest.

Historically, a distinctly bimodal pattern of freshwater entry could be used to distinguish A-run and B-run fish. A-run steelhead were presumed to cross Bonneville Dam from June to late August whereas B-run steelhead enter from late August to October. The TAC reviewed the available information on timing and confirmed that the majority of large fish do still have a later timing at Bonneville; 70% of the larger fish crossed the dam after August 26, the traditional cutoff date for separating A- and B-run fish (TAC 1999). However, the timing of the early part of the A-run has shifted somewhat later, thereby reducing the timing separation that was so apparent in the 1960s and 1970s. The timing of the larger, natural-origin B-run fish has not changed.

The abundance of A-run versus B-run components of Snake River Basin steelhead can be distinguished in data collected since 1985. Both components have declined through the 1990s, but the decline of B-run steelhead has been more significant. The 4-year average counts at Lower Granite Dam declined from 18,700 to 7,400 beginning in 1985 for A-run steelhead and from 5,100 to 900 for B-run steelhead. Counts over the last 5 or 6 years have been stable for A-run steelhead and without significant trend (Figure 2). Counts for B-run steelhead have been low and highly variable, but also without apparent trend (Figure 3).

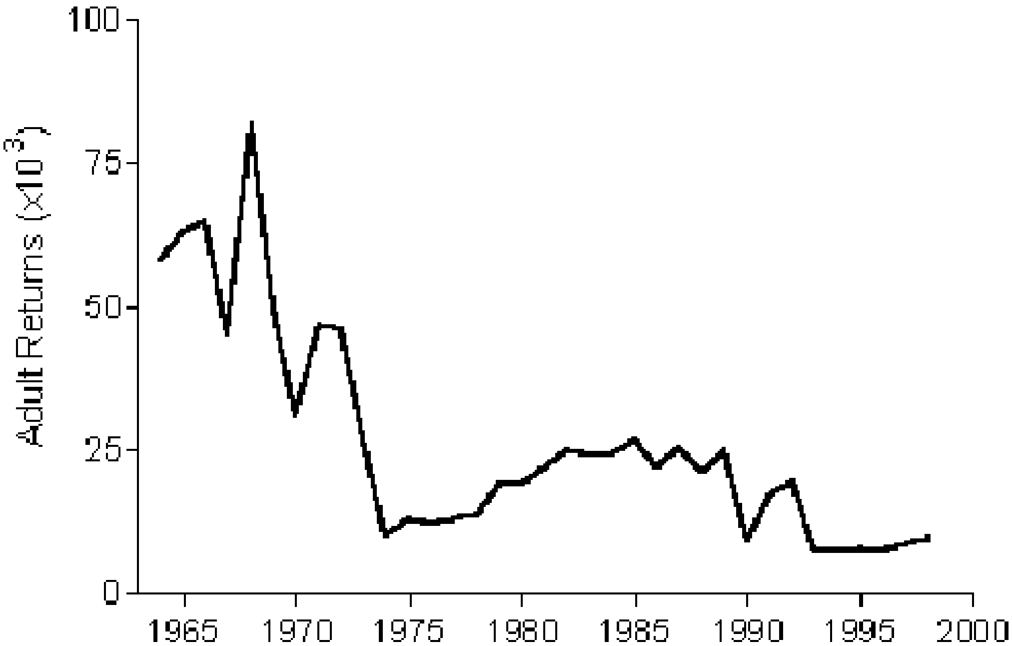
Comparison of recent dam counts with escapement objectives provides perspective regarding the status of the evolutionary significant unit (ESU). The management objective for Snake River steelhead stated in the Columbia River Fisheries Management Plan was to return 30,000 natural/wild steelhead to Lower Granite Dam. The All Species Review (TAC 1997) further clarified that this objective was subdivided into 20,000 A-run and 10,000 B-run steelhead. Idaho has reevaluated these escapement objectives using estimates of juvenile production capacity. This alternative methodology lead to revised estimates of 22,000 for A-run and 31,400 for B-run steelhead (pers. comm., S. Keifer, Idaho Department of Fish and Game with P. Dygert, NOAA's National Marine Fisheries Service).

The State of Idaho has conducted redd count surveys in all of the major subbasins since 1990. Although the surveys are not intended to quantify adult escapement, they can be used as indicators of relative trends. The sum of redd counts in natural-origin B-run production subbasins declined from 467 in 1990 to 59 in 1998 (Figure 4). The declines are evident in all four of the primary B-run production areas. Index counts in the natural-origin A-run production areas have not been conducted with enough consistency to permit similar characterization.

Idaho has also conducted surveys for juvenile abundance in index areas throughout the Snake River Basin since 1985. Parr densities of A-run steelhead have declined from an average of about 75% of carrying capacity in 1985 to an average of about 35% in recent years through 1995 (Figure 5). Further declines were observed in 1996 and 1997. Parr densities of B-run steelhead have been low, but relatively stable since 1985, averaging 10% to 15% of carrying capacity through 1995. Parr densities in B-run tributaries declined further in 1996 and 1997 to 11% and 8%, respectively.

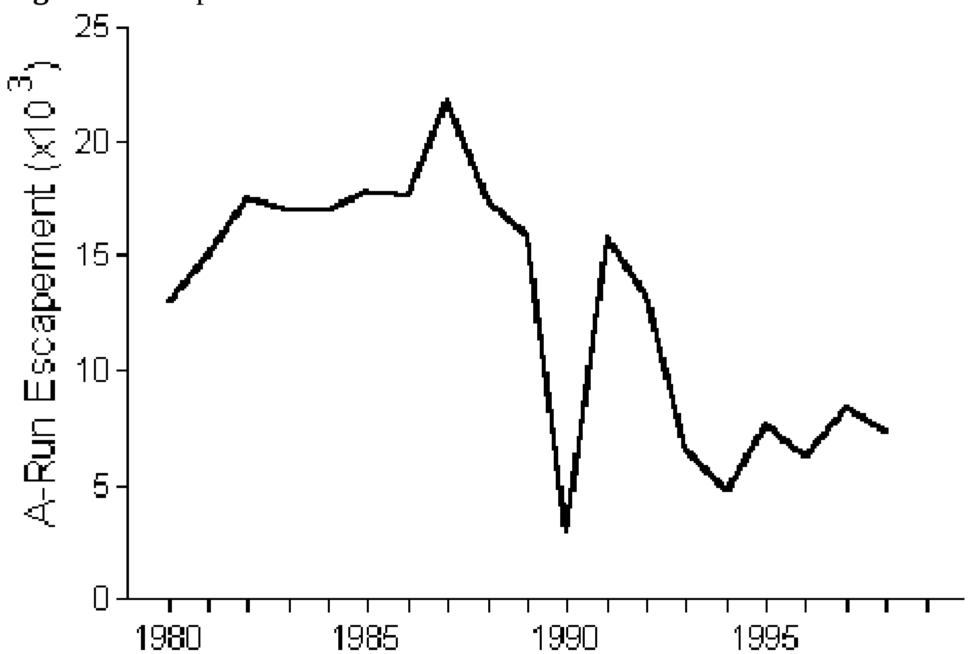
It is apparent from the available data that B-run steelhead are much more depressed than the A-run component. In evaluating the status of the Snake River Basin steelhead ESU, it is pertinent to consider if B-run steelhead represent a "significant portion" of the ESU. This is particularly relevant because the Tribes have proposed to manage the Snake River Basin steelhead ESU as a whole without distinguishing between components, and further, that it is inconsistent with NOAA's National Marine Fisheries Service (NOAA Fisheries) authority to manage for components of an ESU.

Figure 1. Adult Returns of Wild Summer Steelhead to Lower Granite Dam on the Snake River.



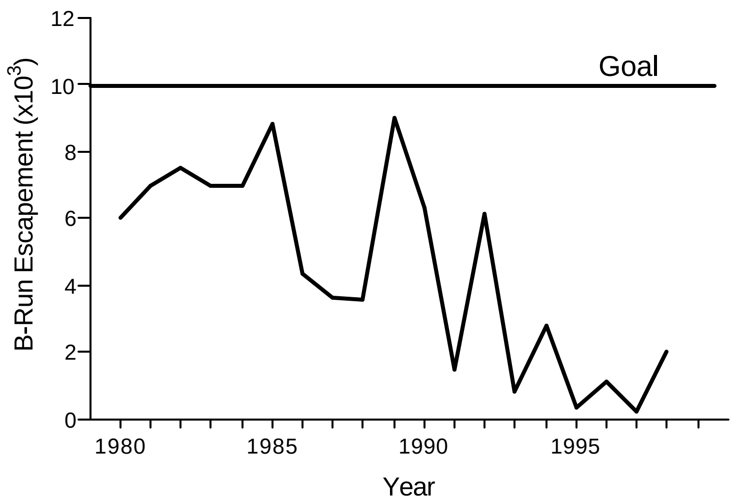
Source: Escapement through 1995 from TAC (1997); escapement for 1996–1998 from pers. comm. G. Mauser (IDFG).

Figure 2. Escapement of A-Run Snake River Steelhead to Lower Granite Dam.



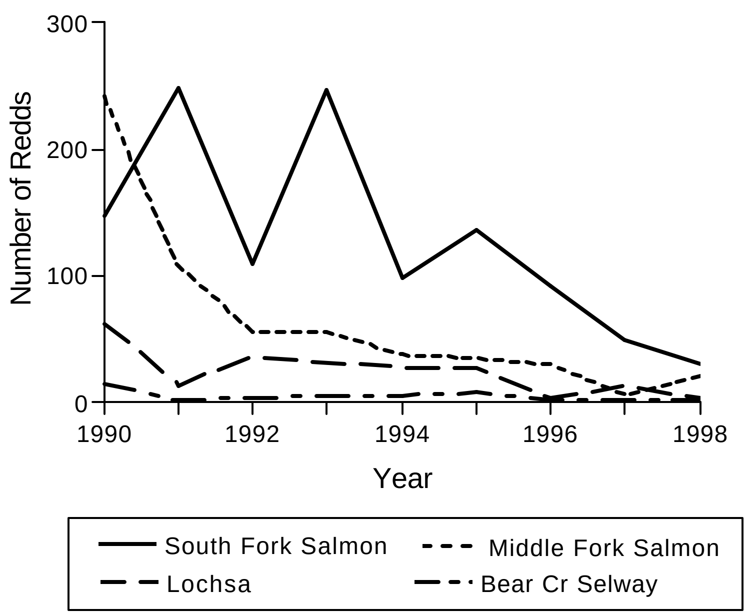
Source: Data for 1980 through 1984 from Figures 1 and 2 of Section 8 in TAC (1997). Data for 1985 through 1998 from Table 2 of Section 8
(TAC 1997) and pers. comm . G. Mauser, (IDFG).

Figure 3. Escapement of B-Run Snake River Steelhead to Lower Granite Dam.



Source: Data for 1980 through 1984 from Figures 1 and 2 of Section 8 in TAC (1997). Data for 1985 through 1998 from Table 2 of Section 8
(TAC 1997) and pers. comm. G. Mauser (IDFG).

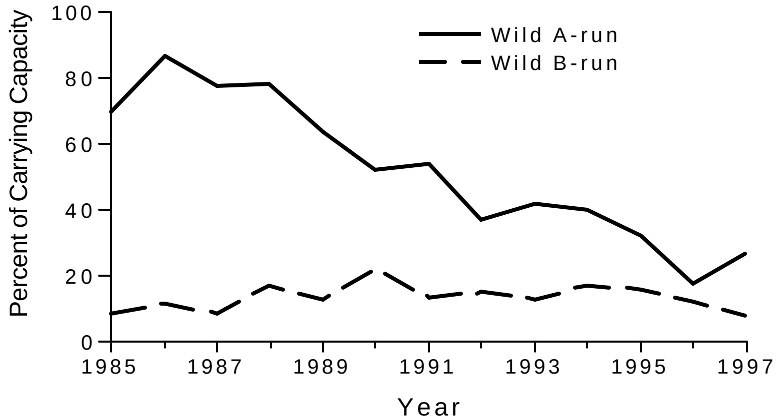
Figure 4. Redd Counts for Wild Snake River (B-Run) Steelhead in the South Fork and Middle Fork Salmon, Lochsa, and Bear Creek-Selway Index Areas.



Data for the Lochsa exclude Fish Creek and Crooked Fork.

Sources: memo from T. Holubetz (IDFG), "1997 Steelhead Redd Counts", dated May 16, 1997, and IDFG (unpublished).

Figure 5. Estimated Carrying Capacity for Juvenile (Age-1+ and -2+) Wild-A and B-Run Steelhead in Idaho Streams



Source:
Data for 1985 through 1996 from (Hall-Griswold and Petrosky 1998); data for 1997 from IDFG (unpublished).

It is first relevant to put the Snake River basin into context. The Snake River historically supported over 55% of total natural-origin production of steelhead in the Columbia River Basin and now has approximately 63% of the basin's natural production potential (Mealy 1997). B-run steelhead occupy four major subbasins including two on the Clearwater River (Lochsa and Selway) and two on the Salmon River (Middle Fork and South Fork Salmon), areas that for the most part are not occupied by A-run steelhead. Some natural B-run steelhead are also produced in parts of the mainstem Clearwater and its major tributaries. There are alternative escapement objectives for B-run steelhead of 10,000 (TAC 1997) and 31,400 (Idaho). B-run steelhead, therefore, represent at least 1/3 and as much as 3/5 of the production capacity of the ESU.

As pointed out above, the geographic distribution of B-run steelhead is restricted to particular watersheds within the Snake River Basin (areas of the mainstem Clearwater, Selway, and Lochsa Rivers and the South and Middle Forks of the Salmon River). No recent genetic data are available for steelhead populations in South and Middle Forks of the Salmon River. The Dworshak National Fish Hatchery (NFH) stock and natural populations in the Selway and Lochsa Rivers are thus far the most genetically distinct populations of steelhead in the Snake River Basin (Waples et al. 1993). In addition, the Selway and Lochsa River populations from the Middle Fork Clearwater appear to be very similar to each other genetically, and naturally produced rainbow trout from the North Fork Clearwater River (above Dworshak Reservoir) clearly show an ancestral genetic similarity to Dworshak NFH steelhead. The existing genetic data, the restricted geographic distribution of B-run steelhead in the Snake (Columbia) River Basin, and the unique life history attributes of these fish (i.e. larger, older adults with a later distribution of
run timing compared to A-run steelhead in other portions of the Columbia River Basin) clearly support the conservation of B-run steelhead as a biologically significant component of the Snake River ESU.

Another approach to assessing the status of an ESU being developed by NOAA Fisheries is to consider the status of its component populations. For this purpose a population is defined as a group of fish of the same species spawning in a particular lake or stream (or portion thereof) at a particular season, which to a substantial degree do not interbreed with fish from any other group spawning in a different place or in a the same place at a different season. Because populations as defined here are relatively isolated, it is biologically meaningful to evaluate the risk of extinction of one population independently from any other. Some ESUs may be comprised of only one population whereas others will be constituted by many. The background and guidelines related to the assessment of the status of populations is described in a recent draft report discussing the concept of viable salmonid populations (McElhany et al. 2000).

The task of identifying populations within an ESU will require making judgements based on the available information. Information regarding the geography, ecology, and genetics of the ESU are relevant to this determination. Although NOAA Fisheries has not compiled and formally reviewed all the available information for this purpose, it is reasonable to conclude that, at a minimum, each of the major subbasins in the ESU represent a population within the context of this discussion. A-run populations would therefore include at least the tributaries to the lower Clearwater, the upper Salmon River and its tributaries, the lower Salmon River and its tributaries, the Grand Ronde, Imnaha, and possibly the Snake River mainstem tributaries below Hells Canyon Dam. B-run populations would be identified in the Middle Fork and South Fork Salmon Rivers and the Lochsa and Selway Rivers (major tributaries of the upper Clearwater), and possibly in the mainstem Clearwater River, as well. These basins are, for the most part, large geographical areas and it is quite possible that there is additional population structure within at least some of these basins. However, because that hypothesis has not been confirmed, NOAA Fisheries assumes that there are at least five populations of A-run steelhead and five populations of B-run steelhead in the Snake River basin ESU. Escapement objectives for A and B-run production areas in Idaho, based on estimates of smolt production capacity, are shown in Table 1.

Table 1. Adult Steelhead Escapement Objectives Based on Estimates of 70% Smolt Production Capacity

A-Run Production Areas		B-Run Production Areas	
Upper Salmon	13,570	Mid Fork Salmon	9,800
Lower Salmon	6,300	South Fork Salmon	5,100
Clearwater	2,100	Lochsa	5,000
Grand Ronde	(1)	Selway	7,500
Imnaha	(1)	Clearwater	4,000
Total	**21,970**	**Total**	**31,400**

Note: comparable estimates are not available for populations in Oregon and Washington subbasins.

1.2.1 Lower Snake River Subbasin

Information on steelhead distribution, important watersheds, and conditions and trends in the Lower Snake River is summarized from the Lower Snake River Subbasin Biological Assessment (BLM 2000a), except where noted.

1.2.1.1 Species Distribution:

Within the Lower Snake River Subbasin steelhead use occurs in most of the accessible streams when stream conditions are suitable. Steelhead use the mainstem Snake River for upstream and downstream passage. A limited amount of juvenile rearing and overwintering by adults occurs in the Snake River. Most accessible tributaries are used by steelhead for spawning and rearing. The larger streams used for spawning and rearing include Asotin, Ten Mile, Couse, Captain John, Jim, and Cook Creeks. Other smaller tributary streams with limited rainbow/steelhead use include Tammany, Tenmile, Corral, Cache, Cottonwood, and Cherry Creeks.

1.2.1.2 Location of Important Spawning and Rearing Areas:

Asotin Creek, followed by Captain John, Ten Mile, and Couse Creeks have the highest potential for steelhead production within the subbasin. Priority watersheds include Asotin and Captain John Creeks.

1.2.1.3 Conditions and Trends of Populations:

Despite their relatively broad distribution, very few healthy steelhead populations exist (Quigley and Arbelbide 1997). Recent status evaluations suggest many steelhead stocks are depressed. A recent multi-agency review showed that total escapement of salmon and steelhead to the various Columbia River regions has been in decline since 1986 (Anderson et al. 1996). Existing steelhead stocks consist of four main types: wild, natural (non-indigenous progeny spawning naturally), hatchery, and mixes of natural and hatchery fish. Production of wild anadromous fish in the Columbia River Basin has declined about 95% from historical levels (Huntington et al. 1994). Most existing steelhead production is supported by hatchery and natural fish as a result of large-scale hatchery mitigation production programs. Wild, indigenous fish, unaltered by hatchery stocks, are rare and present in only 10% of the historical range and 25% of the existing range. Remaining wild stocks are concentrated in the Salmon and Selway (Clearwater Basin) rivers in central Idaho and the John Day River in Oregon. Although few wild stocks were classified as strong, the only subwatersheds classified as strong were those sustaining wild stocks.

<u>1.2.2 Clearwater River, North Fork Clearwater River, and Middle Fork Clearwater River Subbasins</u>

Information on steelhead distribution, important watersheds, and conditions and trends in the Clearwater River is summarized from the Clearwater River, North Fork Clearwater River and Middle Fork Clearwater River Subbasins Biological Assessment (BLM 2000b), except where noted.

1.2.2.1 Species Distribution:

Within the Clearwater River Subbasin steelhead use is widespread and most accessible tributaries are used year-long or seasonally. In the Clearwater River drainage, the primary steelhead producing streams include: Potlatch River; Lapwai, Big Canyon, Little Canyon, Lolo, and Lawyer Creeks. Other Clearwater River mainstem tributary streams providing spawning and/or rearing habitat for steelhead trout include Lindsay, Hatwai, Lapwai, Catholic, Cottonwood, Pine, Bedrock, Jacks, Big Canyon, Orofino, Jim Ford, Big, Fivemile, Sixmile, and Tom Taha Creeks. Some of these streams provide sub-optimal spawning and rearing habitat because of steep stream gradients, barriers, low flows, limited spawning gravels, and small size of tributaries.

In the 1969 the U.S. Army Corps of Engineers finished construction of Dworshak Dam on the North Fork Clearwater River, which totally blocked access to anadromous fish. To mitigate for the steelhead losses resulting from the dam, Dworshak National Fish Hatchery (NFH) was constructed in 1969. Wild B-run steelhead are collected at the base of the dam and used as the brood stock for Dworshak NFH. Since 1992, steelhead eggs collected at Dworshak NFH have been shipped as eyed eggs to the Clearwater Fish Hatchery, located at the confluence of the North Fork Clearwater River and the Clearwater River, for incubation and rearing.

Three satellite facilities are associated with the Clearwater Fish Hatchery: Crooked River, Red River, and Powell. The Kooskia NFH is located on Clear Creek, a tributary to the Middle Fork Clearwater River.

1.2.2.2 Location of Important Spawning and Rearing Areas:

The only watershed identified as a special emphasis or priority watershed for steelhead in the Clearwater River Subbasin is Lolo Creek.

1.2.2.3 Conditions and Trends of Populations:

Refer to “Conditions and Trends of Populations” under Lower Snake River Subbasin above.

1.2.3 South Fork Clearwater River Subbasin

Information on steelhead distribution, important watersheds, and conditions and trends in the South Fork Clearwater River is summarized from the Draft Clearwater Subbasin Assessment (CPAG 2002), except where noted.

1.2.3.1 Species Distribution:

Within the South Fork Clearwater River Subbasin, steelhead use is widespread, and most accessible tributaries are used year-long or seasonally. In the South Fork drainage, the primary steelhead producing drainages include Newsome Creek, American River, Red River, and Crooked River. Other South Fork Clearwater River mainstem tributary streams providing spawning and/or rearing habitat for steelhead trout include Tenmile, Johns, Meadow, and Mill Creeks (Jody Brostrom, Idaho Department of Fish and Game, pers. comm. March 30, 2001). Low order streams and accessible headwater portions of high order streams provide early rearing habitat (Nez Perce National Forest 1998).

1.2.3.2 Location of Important Spawning and Rearing Areas:

Important spawning habitat in the South Fork Clearwater occurs primarily in Newsome Creek, American River, Red River, and Crooked River.

1.2.3.3 Conditions and Trends of Populations:

The South Fork Clearwater River may have historically maintained a genetically unique stock of steelhead trout, but hatchery supplementation has since clouded the lines of genetic distinction between stocks (Nez Perce National Forest 1998). Robin Waples (In a letter to S. Kiefer, Idaho Department of Fish and Game, August 25, 1998) found that steelhead in Johns and Tenmile Creeks are genetically most similar to fish originating from the Selway River system, suggesting that some genetic difference may have existed historically within the South Fork Clearwater drainage. A statewide genetic analysis is currently being conducted using DNA markers, and may provide more information on past and current genetic distinctions between steelhead stocks in the Clearwater subbasin (Byrne 2001).

1.2.4 Selway River Subbasin

Information on steelhead distribution, important watersheds, and conditions and trends in the Selway River is summarized from the Lower Selway Biological Assessment (USFS 1999a), the

Biological Opinion on Culvert Replacements on Lolo Creek and Lochsa River (NMFS 2002a), and the Biological Opinion on Recreational Suction Dredge Mining in Lolo Creek (NOAA Fisheries 2003), except where noted.

1.2.4.1 Species Distribution:

High numbers of juvenile steelhead have been documented in all of the fifth code watersheds above the Selway-Bitterroot wilderness boundary. In addition, Meadow and Gedney Creeks also support high numbers of both steelhead and resident rainbow trout. Densities of steelhead are less in O'hara, Swiftwater, Goddard, and Falls Creeks (USFS unpublished data 1990 - 1998). Densities in Nineteenmile, Rackliffe, Boyd, and Glover Creeks are limited by small size and accessibility although the species is present. Spawning habitat for steelhead has been documented in most of the surveyed tributaries, including small third order streams such as Renshaw and Pinchot Creeks. In the Selway River, stream survey data and casual observations suggest that the steelhead/rainbow population in the larger tributaries, i.e. Meadow and Moose Creeks, are composed of a significant resident rainbow/redband component (USFS unpublished data 1996, 1997). Survey data and observations revealed the presence of large number of rainbow trout greater than 220 mm, especially in North Moose Creek. In addition, observations suggest the presence of two distinct forms of this species. Steelhead and rainbow of all sizes differed phenotypically; there appeared to be a distinct "steelhead" presmolt form, which was more bullet-shaped and silvery in color, and a distinct "trout" form, which was less bullet-shaped, retained parr marks at larger sizes, and exhibited coloration and spotting more typical of other inland rainbow populations. It is possible that resident rainbow trout and steelhead are reproductively isolated, which may have resulted in genetic divergence. Analysis of the genetic composition of the Moose Creek population may be attempted in future years.

1.2.4.2 Location of Important Spawning and Rearing Areas:

The most important spawning and rearing areas for steelhead are located in the larger tributaries, such as Meadow, Moose, Gedney, Three Links, Marten, Bear, Whitecap, Running, Ditch, Deep, and Wilkerson Creeks. Moose Creek may support the most significant spawning and rearing habitat for steelhead trout of any of these tributaries.

1.2.4.3 Conditions and Trends of Populations:

The Selway River drainage (along with the Lochsa and lower Clearwater River tributary systems) is one of the only drainages in the Clearwater Subbasin where steelhead populations have little or no hatchery influence (Busby et al. 1996; IDFG 2001). The USFS (1999a) identified the Lochsa and Selway River systems as refugia areas for steelhead based on location, accessibility, habitat quality, and number of roadless tributaries. The Idaho Department of Fish and Game (IDFG) estimates that approximately 80% of the wild steelhead in the Clearwater River Subbasin are destined for the Lochsa River and Selway River drainages. The Clearwater River Basin produces the majority of B-run steelhead in the Snake River ESU, and most of the Clearwater steelhead are produced in the Lochsa River Subbasin. The Lochsa River Subbasin has the highest observed densities of age 1+ B-run steelhead parr, and the highest percent carrying capacity (IDFG 1999). Hatchery steelhead were used to supplement natural populations in the Lochsa River drainage before 1982, but current management does not include any hatchery supplementation. Current adult returns are considered to be almost entirely wild steelhead trout progeny.

1.2.5 Lochsa River Subbasin

Information on steelhead distribution, important watersheds, and conditions and trends in the Lochsa River is summarized from the Biological Opinion on Culvert Replacements on Lolo Creek and Lochsa River (NMFS 2002a) and the Biological Opinion on Recreational Suction Dredge Mining in Lolo Creek (NOAA Fisheries 2003), except where noted.

1.2.5.1 Species Distribution:

Adult Snake River steelhead are present in the upper mainstem Clearwater River in September and October, and in the upper mainstem and Middle Fork Clearwater Rivers in the winter. Spawning and incubation occurs in streams such as the Lochsa River from March through July. Steelhead juveniles then typically rear for 2 to 3 years in the tributaries and larger rivers before beginning a seaward migration during February through May.

1.2.5.2 Location of Important Spawning and Rearing Areas:

Steelhead have been observed in most of the larger tributaries to the Lochsa River, with high steelhead productivity occurring in Fish, Boulder, Deadman, Pete King, and Hungery Creeks (USFS 1999b).

1.2.5.3 Conditions and Trends of Populations:

Refer to "Conditions and Trend of Populations" under Selway River Subbasin above.

<u>1.2.6 Lower Salmon River Subbasin</u>

Information on steelhead distribution, important watersheds, and conditions and trends in the Lower Salmon River is summarized from the Lower Salmon River Subbasin Biological Assessment (BLM 2000c).

1.2.6.1 Species Distribution:

Within the Lower Salmon River Subbasin, steelhead use occurs in most of the accessible streams when stream conditions are suitable. Steelhead use the mainstem Salmon River for upstream and downstream passage. A limited amount of juvenile rearing and adult overwintering may occur in the Salmon River. Most accessible tributaries are used by steelhead for spawning and rearing. The larger streams used for spawning and rearing include China, Eagle, Deer, Cottonwood, Maloney, Deep, Rice, Rock, White Bird, Skookumchuck, Slate, John Day, Race, Lake, Allison, Partridge, Elkhorn, and French Creeks. Other smaller tributary streams with limited rainbow/steelhead use include Flynn, Wapshilla, Billy, Burnt, Round Springs, Telcher, Deer, McKinzie, Christie, Sherwin, China, Cow, Fiddle, Warm Springs, Van, and Robbins Creeks.

1.2.6.2 Location of Important Spawning and Rearing Areas:

Slate Creek, followed by White Bird Creek, has the highest potential for steelhead production within the subbasin. Priority watersheds identified for steelhead include China, Eagle, Deer, White Bird, Skookumchuck, Slate, John Day, Race, Allison, Partridge, and French Creeks. Other streams which are important for spawning and rearing include Cottonwood, Maloney, Deep, Rice, Rock, Lake, and Elkhorn Creeks.

1.2.6.3 Conditions and Trends of Populations:

The Bureau of Land Management (BLM) noted that current numbers of naturally spawning steelhead in the Salmon River Subbasin are at all time lows, and overall trend is downward. Adult steelhead were commonly observed in most larger tributaries during the 1970s through 1980s, but now such observations have significantly declined (BLM 2000c).

The Nez Perce National Forest conducted an ecosystem analysis at the watershed scale for Slate Creek (USFS 2000) and concluded that the distribution of fish species assessed is relatively consistent with historic distribution. Steelhead populations are thought to have experienced a great decline from historic levels although the data to describe the extent of this reduction is not available (USFS 2000). The BLM has conducted trend monitoring of fish populations in lower Partridge Creek and French Creek. Partridge Creek densities of age 0 rainbow/steelhead in 1988 were 0.30 fish/m2 and age 1 rainbow/steelhead trout densities were 0.19 fish/m2. In 1997, age 0 densities were 0.003 fish/m2 and age 1 densities were 0.01 fish/m2. French Creek densities of age 0 rainbow/steelhead trout in 1991 were 0.07 fish/m2 and age 1 rainbow/steelhead densities were 0.07 fish/m2. In 1997, age 0 densities were 0.0075 fish/m2 and age 1 densities were 0.02 fish/m2. Densities of steelhead trout have significantly declined from the 1980s through the late 1990s.

1.2.7 Little Salmon River Subbasin

Information on steelhead distribution, important watersheds, and conditions and trends in the Little Salmon River is summarized from the Little Salmon River Subbasin Biological Assessment (BLM 2000d), except where noted.

1.2.7.1 Species Distribution:

Within the Little Salmon River Subbasin, steelhead trout use occurs in the lower portion of the subbasin and tributaries, downstream from barriers located at river mile (RM) 21 in the Little Salmon River. No recent or historic documentation exists for steelhead using streams above RM 24 in the Little Salmon River. Welsh et al. (1965) reports that no known passage by salmon or steelhead exists above the Little Salmon River falls. Ineffectual fish passage facilities were constructed at the falls by the Civilian Conservation Corps during the 1930s (Welsh et al. 1965). Streams and rivers providing important spawning and rearing for steelhead include Little Salmon and River Rapid Rivers, and Boulder, Hazard, and Hard Creeks. Other Little Salmon River mainstem tributary streams providing spawning and rearing habitat include Squaw, Sheep, Hat, Denny, Lockwood, Rattlesnake, Elk, and Trail Creeks. Adult steelhead have been documented in these streams. Primary steelhead use of these streams is often associated with the mouth area or a small stream segment or lower reach, before steep gradients/cascades or a barrier restricts upstream fish passage. These streams generally provide sub-optimal spawning and rearing habitat because of steep stream gradients, barriers, low flows, limited spawning gravels, and small size of tributaries.

1.2.7.2 Location of Important Spawning and Rearing Areas:

Priority watersheds for steelhead include Rapid River, Boulder, Hazard, and Hard Creeks. These streams provide important spawning and rearing habitat for steelhead. Rapid River is a stronghold and key refugia area for steelhead.

1.2.7.3 Conditions and Trends of Populations:

The BLM noted that current numbers of naturally spawning steelhead in the Little Salmon River Subbasin are at all-time lows, and overall trend is downward. The highest number of adult natural spawning steelhead counted at the Rapid River weir was 162 in 1993, and the lowest counted was 10 in 1999 (BLM 2000d).

1.2.8 Middle Salmon River Subbasin

Information on steelhead distribution, important watersheds, and conditions and trends in the Middle Salmon River is summarized from the Middle Salmon River and South Fork Salmon River Subbasins Biological Assessment (BLM 2000e), except where noted.

1.2.8.1 Species Distribution:

Within the Middle Salmon River Subbasin, steelhead use the mainstem Salmon River for upstream and downstream passage. A limited amount of juvenile rearing and adult overwintering may occur in the Middle Salmon River. Most accessible tributaries are used by steelhead for spawning and rearing. Key steelhead spawning and rearing is probably occurring in Crooked, Bargamin and Sabe Creeks and the lower Wind River on the north side of the Salmon River and California, Warren, Chamberlain, and Horse Creeks on the south side of the Salmon River.

1.2.8.2 Location of Important Spawning and Rearing Areas:

Priority watersheds for steelhead include Warren and California Creeks. Steelhead use Warren Creek for spawning and rearing habitat. No fish passage barriers exist for steelhead within the drainage. Steelhead were found in Richardson, Stratton, Steamboat, and Slaughter Creeks (Raleigh 1995).

Most other tributaries were surveyed, but no steelhead were found. Because of habitat alterations from past mining (e.g., in-channel dredging, piling of dredged material adjacent to streams) and limited suitable habitat, steelhead use of the upper portion of the Warren Creek subwatershed is limited. Carey and Bear Creeks provide habitat in the lower reaches.

1.2.8.3 Conditions and Trend of Populations:

Refer to "Conditions and Trends of Populations" under Lower Salmon River Subbasin above.

1.2.9 South Fork Salmon River Subbasin

Information on steelhead distribution, important watersheds, and conditions and trends in the South Fork Salmon River is summarized from the Middle Salmon River and South Fork Salmon River Subbasins Biological Assessment (BLM 2000e), except where noted.

1.2.9.1 Species Distribution:

Steelhead have been documented in the South Fork Salmon River and lower portions of its major tributaries. Most of the mainstem spawning occurs between the East Fork Salmon River and Cabin Creek. Principle spawning areas are located near Stolle Meadows, from Knox Bridge to Penny Spring, Poverty Flat, Darling cabins, the Oxbow, and from 22 Hole to Glory Hole (USFS 1998).

1.2.9.2 Location of Important Spawning and Rearing Areas:

Primary spawning tributaries in the South Fork Salmon River Subbasin are Burntlog, Lick, Lake, and Johnson Creeks, the East Fork South Fork Salmon and Secesh Rivers (USFS 1998).

1.2.9.3 Conditions and Trends of Populations:

Refer to "Conditions and Trends of Populations" under Lower Salmon River Subbasin above.

1.2.10 Upper Salmon River Subbasin

Information on steelhead distribution, important watersheds, and conditions and trends in the Upper Salmon River is summarized from the Biological Opinion on Effects of 2002 Herbicide Treatment of Noxious Weeds on Lands Administered by the Salmon-Challis National Forest (NMFS 2002b).

1.2.10.1 Species Distribution:

Steelhead in the Upper Salmon River subbasin occur in most of the accessible streams when stream conditions are suitable. Steelhead use the mainstem for upstream and downstream passage. A limited amount of juvenile rearing and adult overwintering occurs in the Upper Salmon River. Most accessible tributaries are used for spawning and rearing.

1.2.10.2 Location of Important Spawning and Rearing Areas:

Key steelhead spawning and rearing probably occurs in Morgan, Thompson and Panther Creeks, in addition to the Yankee Fork Salmon, Pahsimeroi, North Fork Salmon, East Fork Salmon, and Lemhi Rivers.

1.2.10.3 Conditions and Trends of Populations:

Refer to "Conditions and Trends of Populations" under Lower Salmon River Subbasin above.

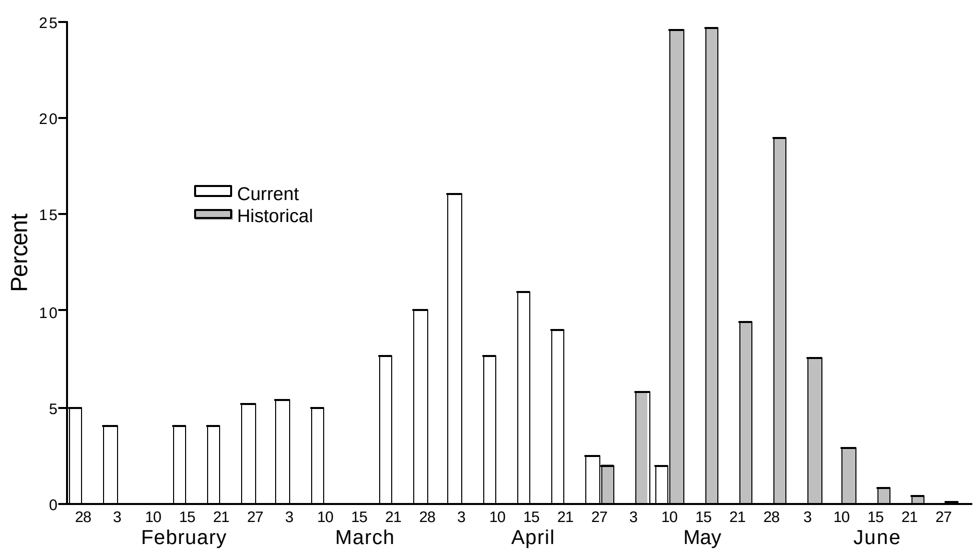
1.3 Hatchery Populations

Hatchery populations, if genetically similar to their natural-origin counterparts, provide a hedge against extinction of the ESU or of the gene pool. The Imnaha and Oxbow hatcheries produce A-run stocks that are currently included in the Snake River basin steelhead ESU. The Pahsimeroi and Wallowa hatchery stocks may also be appropriate and available for use in developing supplementation programs; NOAA Fisheries required in its recent biological opinion on Columbia basin hatchery operations that this program begin to transition to a local-origin broodstock to provide a source for future supplementation efforts in the lower Salmon River (NMFS 1999). Although other stocks provide more immediate opportunities to initiate supplementation programs within some subbasins, it may also be necessary and desirable to develop additional broodstocks that can be used for supplementation in other natural production areas. Despite uncertainties related to the likelihood that supplementation programs can accelerate the recovery of naturally spawning populations, these hatchery stocks provide a safeguard against the further decline of natural-origin populations.

The Dworshak NFH is unique in the Snake River Basin in producing a B-run hatchery stock. The Dworshak stock was developed from natural-origin steelhead from the North Fork Clearwater River, is largely free of other hatchery introductions, and was therefore included in the ESU, although not as part of the listed population. However, past hatchery practices and possibly changes in flow and temperature conditions related to Dworshak Dam have lead to substantial divergence in spawn timing of the hatchery stock compared to historical timing in the North Fork Clearwater River, and compared to natural-origin populations in other parts of the Clearwater Basin. Because the spawn timing of the hatchery stock is much earlier than historically (Figure 6), the success of supplementation efforts using these stocks may be limited. In fact, past supplementation efforts in the South Fork Clearwater River using Dworshak NFH stock have been largely unsuccessful, although improvements in out-planting practices have the potential to yield different results. In addition, the unique genetic character of Dworshak NFH steelhead will limit the degree to which the stock can be used for supplementation in other parts of the Clearwater Subbasin, and particularly in the Salmon River B-run basins. Supplementation efforts in those areas, if undertaken, will more likely have to rely on the future development of local broodstocks. Supplementation opportunities in many of the B-run production areas may be limited because of logistical difficulties associated with high mountain, wilderness areas.

Because opportunities to accelerate the recovery of B-run steelhead through supplementation, even if successful, are expected to be limited, it is essential to maximize the escapement of natural-origin steelhead in the near term.

Figure 6. Historical Versus Current Spawn-Timing of Steelhead at Dworshak Hatchery.



1.4 Conclusion

Finally, the conclusion and recommendations of the TAC's All Species Review (TAC 1997) are pertinent to this status review of Snake River steelhead. Considering information available through 1996, the 1997 All Species Review stated:

> "Regardless of assessment methods for A and B steelhead, it is apparent that the primary goal of enhancing the upriver summer steelhead run is not being achieved. The status of upriver summer steelhead, particularly natural-origin fish, has become a serious concern. Recent declines in all stocks, across all measures of abundance, are disturbing."
>
> "There has been no progress toward rebuilding upriver runs since 1987. Throughout the Columbia River basin, dam counts, weir counts, spawning surveys, and rearing densities indicate natural-origin steelhead abundance is declining, culminating in the proposed listing of upriver stocks in 1996. Escapements have reached critically low levels despite the relatively high productivity of natural and hatchery rearing environments. Improved flows and ocean conditions should increase smolt-adult survival rates for upriver summer steelhead. However, reduced returns in recent years are likely to produce fewer progeny and lead to continued low abundance."
>
> "Although steelhead escapements would have increased (some years substantially) in the absence of mainstem fisheries, data analyzed by the TAC indicate that effects other than mainstem Columbia River fishery harvest are primarily responsible for the currently depressed status and the long term health and productivity of wild steelhead populations in the Columbia River."
>
> "Though harvest is not the primary cause of declining summer steelhead stocks, and harvest rates have been below guidelines, harvest has further reduced escapements. Prior to 1990, the aggregate of upriver summer steelhead in the mainstem Columbia River appears at times to have led to the failure to achieve escapement goals at Lower Granite Dam. Wild Group B steelhead are presently more sensitive to harvest than other salmon stocks, including the rest of the steelhead run, due to their depressed status and because they are caught at higher rates in the Zone 6 fishery."

Small or isolated populations are much more susceptible to stochastic events such as drought and poor ocean conditions. Harvest can further increase the susceptibility of such populations. The Columbia River Fish Management Plan (TAC 1997) recognizes that harvest management must be responsive to run size and escapement needs to protect these populations. The parties should ensure that TAC 1997 harvest guidelines are sufficiently protective of weak stocks and hatchery broodstock requirements.

For the Snake River steelhead ESU as a whole, the median population growth rate (lambda) from years 1980-1997, ranges from 0.699 to 0.978, depending on the assumed number of hatchery fish reproducing in the river (Table 2). NOAA Fisheries estimated the risk of absolute extinction for A- and B-runs, based on assumptions of complete hatchery spawning success, and no hatchery spawning success. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (i.e., hatchery effectiveness = 0), the risk of absolute extinction within 100 years is 0.01 for A-run steelhead and 0.93 for B-run fish. At the high end, assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness = 100%), the risk of absolute extinction within 100 years is 1.00 for both runs.

Table 2. Annual rate of population change (λ) in Snake River steehead, absolute risk of extinction (1 fish/generation), and risk of 90% decline in 24 and 100 years for the period 1980-1997†. The range of reported values assumes that hatchery-origin fish either do not contribute to

Model Assumptions	l	**Risk of Extinction**		**Probability of 90% decrease in stock abundance**	
		24 years	100 years	24 years	100 years
No Correction for Hatchery Fish	0.978	A-Run 0.000 B-Run 0.000	A-Run 0.000 B-Run 0.000	A-Run 0.000 B-Run 0.060 Aggregate 0.000	A-Run 0.000 B-Run 0.520 Aggregate 0.434
No Instream Hatchery Reproduction	0.910	A-Run 0.000 B-Run 0.000	A-Run 0.010 B-Run 0.093	A-Run 0.200 B-Run 0.730 Aggregate 0.476	A-Run 1.000 B-Run 1.000 Aggregate 1.000
Instream Hatchery Reproduction = Natural Reproduction	0.699	A-Run 0.000 B-Run 0.000	A-Run 1.000 B-Run 1.000	A-Run 1.000 B-Run 1.000 Aggregate 1.000	A-Run 1.000 B-Run 1.000 Aggregate 1.000

† From Table B-2a and B-2b. Cumulative Risk Initiative. September 5, 2000, revised appendix B (McClure et al. 2000).

natural production or are as productive as natural-origin spawners.

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APPENDIX B

BIOLOGICAL REQUIREMENTS, CURRENT STATUS, AND TRENDS:

SNAKE RIVER SPRING/SUMMER CHINOOK SALMON

1.1 Chinook Salmon Life History

Chinook salmon is the largest of the Pacific salmon. The species' distribution historically ranged from the Ventura River in California to Point Hope, Alaska, in North America, and in northeastern Asia from Hokkaido, Japan, to the Anadyr River in Russia (Healey 1991). Additionally, chinook salmon have been reported in the Mackenzie River area of northern Canada (McPhail and Lindsey 1970). Of the Pacific salmon, chinook salmon exhibit arguably the most diverse and complex life history strategies. Healey (1986), described 16 age categories for chinook salmon, seven total ages with three possible freshwater ages. This level of complexity is roughly comparable to that seen in sockeye salmon (Oncorhynchus nerka), although the latter species has a more extended freshwater residence period and uses different freshwater habitats (Miller and Brannon 1982, Burgner 1991). Two generalized freshwater life-history types were initially described by Gilbert (1912): "stream-type" chinook salmon, which reside in freshwater for a year or more following emergence, and "ocean-type" chinook salmon, which migrate to the ocean within their first year. Healey (1983, 1991) has promoted the use of broader definitions for "ocean-type" and "stream-type" to describe two distinct races of chinook salmon. Healey's approach incorporates life history traits, geographic distribution, and genetic differentiation and provides a valuable frame of reference for comparisons of chinook salmon populations.

The generalized life history of Pacific salmon involves incubation, hatching, and emergence in freshwater; migration to the ocean; and the subsequent initiation of maturation and return to freshwater for completion of maturation and spawning. The juvenile rearing period in freshwater can be minimal or extended. Additionally, some male chinook salmon mature in freshwater, thereby foregoing emigration to the ocean. The timing and duration of each of these stages is related to genetic and environmental determinants and their interactions to varying degrees. Although salmon exhibit a high degree of variability in life-history traits, there is considerable debate as to what degree this variability is shaped by local adaptation or results from the general plasticity of the salmonid genome (Ricker 1972, Healey 1991, Taylor 1991). More detailed descriptions of the key features of chinook salmon life history can be found in Myers et al. (1998) and Healey (1991).

1.2 Population Dynamics, Distribution, Status and Trends

The following sections provide specific information on the distribution and population structure (size, variability, and trends of the stocks or populations) for the listed evolutionary significant unit (ESU). Most of this information comes from observations made in terminal, freshwater areas, which may be distinct from the action area. This focus is appropriate because the species status and distribution can only be measured at this level of detail as adults return to spawn.

1.2.1 Snake River Spring/Summer Chinook Salmon

The present range of spawning and rearing habitat for naturally-spawned Snake River spring/summer chinook salmon is primarily limited to the Salmon, Grande Ronde, Imnaha, and Tucannon Subbasins. Most Snake River spring/summer chinook salmon enter individual subbasins from May through September. Juvenile Snake River spring/summer chinook salmon emerge from spawning gravels from February through June (Perry and Bjornn 1991). Typically, after rearing in their nursery streams for about 1 year, smolts begin migrating seaward in April and May (Bugert et al. 1990; Cannamela 1992). After reaching the mouth of the Columbia River, spring/summer chinook salmon probably inhabit nearshore areas before beginning their northeast Pacific Ocean migration, which lasts 2 to 3 years. Because of their timing and ocean distribution, these stocks are subject to very little ocean harvest. For detailed information on the life history and stock status of Snake River spring/summer chinook salmon, see Matthews and Waples (1991), NOAA Fisheries (1991), and 56 FR 29542 (June 27, 1991).

Bevan et al. (1994) estimated the number of wild adult Snake River spring/summer chinook salmon in the late 1800s to be more than 1.5 million fish annually. By the 1950s, the population had declined to an estimated 125,000 adults. Escapement estimates indicate that the population continued to decline through the 1970s. Returns were variable through the 1980s, but declined further in recent years. Record low returns were observed in 1994 and 1995. Dam counts were modestly higher from 1996 through 1998, but declined in 1999. For management purposes the spring and summer chinook in the Columbia River Basin, including those returning to the Snake River, have been managed as separate stocks. Historical databases, therefore, provide separate estimates for the spring and summer chinook components. Table 1 reports the estimated annual return of adult, natural-origin Snake River spring and summer chinook salmon returning to Lower Granite Dam since 1979.

Table 1. Estimates of Natural-Origin SR Spring/Summer Chinook Salmon Counted at Lower Granite Dam in Recent Years (Speaks 2000)

Year	Spring Chinook	Summer Chinook	Total
1979	2,573	2,712	5,285
1980	3,478	2,688	6,166
1981	7,941	3,326	11,267
1982	7,117	3,529	10,646
1983	6,181	3,233	9,414
1984	3,199	4,200	7,399
1985	5,245	3,196	8,441
1986	6,895	3,934	10,829
1987	7,883	2,414	10,297
1988	8,581	2,263	10,844
1989	3,029	2,350	5,379
1990	3,216	3,378	6,594
1991	2,206	2,814	5,020
1992	11,285	1,148	12,433
1993	6,008	3,959	9,967
1994	1,416	305	1,721
1995	745	371	1,116
1996	1,358	2,129	3,487
1997	1,434	6,458	7,892
1998	5,055	3,371	8,426
1999	1,433	1,843	3,276
		Recovery Esc Level	31,440

NOAA Fisheries set an interim recovery level for Snake River spring/summer chinook salmon (31,400 adults at Ice Harbor Dam) in its proposed recovery plan (NOAA Fisheries 1995). The Snake River spring/summer chinook salmon ESU consists of 39 local spawning populations (subpopulations) spread over a large geographic area (Lichatowich et al. 1993). The number of fish returning to Lower Granite Dam is therefore divided among these subpopulations. The relationships between these subpopulations, and particularly the degree to which individuals may intermix is unknown. It is unlikely that all 39 are independent populations per the definition in McElhany et al. (2000), which requires that each be isolated such that the exchange of individuals between populations does not substantially affect population dynamics or extinction

risk over a 100-year time frame. Nonetheless, monitoring the status of subpopulations provides more detailed information on the status of the species than would an aggregate measure of abundance.

Seven of these subpopulations have been used as index stocks for the purpose of analyzing extinction risk and alternative actions that may be taken to meet survival and recovery requirements. The Snake River Salmon Recovery Team selected these subpopulations primarily because of the availability of relatively long time series of abundance data. The Biological Requirements Work Group (BRWG 1994)) developed recovery and threshold abundance levels for the index stocks, which serve as reference points for comparisons with observed escapements (Table 2). The threshold abundances represent levels at which uncertainties (and thus the likelihood of error) about processes or population enumeration are likely to be biologically significant, and at which qualitative changes in processes are likely to occur. They were specifically not developed as indicators of pseudo-extinction or as absolute indicators of "critical" thresholds. In any case, escapement estimates for the index stocks have generally been well below threshold levels in recent years (Table 2).

Table 2. Number of Adult Spawners, Recovery Levels, and BRWG Threshold Abundance Levels

Brood year	Bear Valley	Marsh	Sulphur	Minam	Imnaha	Poverty Flats	Johnson
1979	215	83	90	40	238	76	66
1980	42	16	12	43	183	163	55
1981	151	115	43	50	453	187	102
1982	83	71	17	104	590	192	93
1983	171	60	49	103	435	337	152
1984	137	100	0	101	557	220	36
1985	295	196	62	625	699	341	178
1986	224	171	385	357	479	233	129
1987	456	268	67	569	448	554	175
1988	1109	395	607	493	606	844	332
1989	91	80	43	197	203	261	103
1990	185	101	170	331	173	572	141
1991	181	72	213	189	251	538	151
1992	173	114	21	102	363	578	180
1993	709	216	263	267	1178	866	357
1994	33	9	0	22	115	209	50
1995	16	0	4	45	97	81	20
1996	56	18	23	233	219	135	49
1997	225	110	43	140	474	363	236
1998	372	164	140	122	159	396	119
1999	72	0	0	96	282	153	49
2000	*58*	*19*	*24*	*240*	na	*280*	*102*
Recovery Level	**900**	**450**	**300**	**450**	**850**	**850**	**300**
BRWG Threshold	**300**	**150**	**150**	**150**	**300**	**300**	**150**

These values are for SR spring/summer chinook salmon index stocks. Spring chinook index stocks: Bear Valley, Marsh, Sulphur and Minam. Summer-run index stocks: Poverty Flats and Johnson. Run-timing for the Imnaha is intermediate. Estimates for 2000 (shown in italics) are based on the preseason forecast.

As of June 1, 2000, the preliminary final aggregate count for upriver spring chinook salmon at Bonneville Dam was 178,000, substantially higher than the 2000 forecast of 134,000[5]. This is the second highest return in 30 years (after the 1972 return of 179,300 adults). Only a small portion of

[5] Source: June 1, 2000, E-mail from R. Bayley (NOAA Fisheries) to S. H. Smith (NOAA Fisheries). "Spring chinook update (end-of-season at Bonneville Dam)."

these are expected to be natural-origin spring chinook destined for the Snake River (5,800). However, the aggregate estimate for natural-origin Snake River spring chinook salmon is substantially higher than the contributing brood year escapements. Comparable returns to the Columbia River mouth in 1995 and 1996 were 1,829 and 3,903, respectively. The expected returns to the index areas were estimated by multiplying the anticipated return to the river mouth by factors that accounted for anticipated harvest (approximately 9%), interdam loss (50%), prespawning mortality (10%), and the average proportion of total natural-origin spring chinook salmon expected to return to the index areas (14.3%). This rough calculation suggests that the returns to each index area would just replace the primary contributing brood year escapement (1996) (Table 2). These results also suggest that other areas may benefit more than the index areas in terms of brood year return rates. The index areas, on average, account for about 14% of the return of natural-origin spring chinook stocks to the Snake River. The substantial return of hatchery fish will also provide opportunities to pursue supplementation options designed to help rebuild natural-origin populations subject to constraints related to population diversity and integrity. For example, expected returns of the Tucannon River (500 listed hatchery and wild fish), Imnaha River (800 wild and 1,600 listed hatchery fish), and Sawtooth Hatchery (368 listed hatchery fish) all represent substantial increases over past years and provide opportunities for supplementation in the local basins designed to help rebuild the natural-origin stocks.

The 2000 forecast for the upriver summer chinook stocks is 33,300, which is again the second highest return in over 30 years, but with only a small portion (2,000) being natural-origin fish destined for the Snake River. The return of natural-origin fish compares to brood year escapements in 1995 and 1996 of 534 and 3,046 and is generally lower than the average returns over the last 5 years (3,466). The expect returns to the Poverty Flats and Johnson Creek index areas using methods similar to those described above indicates that returns will approximately double the returns observed during 1996, the primary contributing brood year (Table 2) and would be at least close to threshold escapement levels. Again, the substantial returns of hatchery fish can be used in selected areas to help rebuild at least some of the natural-origin stocks. Unfortunately, with the exception of the Imnaha, local brood stocks are not currently available for the spring and summer chinook index areas.

The probability of meeting survival and recovery objectives for Snake River spring/summer chinook under various future operation scenarios for the hydrosystem was analyzed through a process referred to as PATH (Plan for Analyzing and Testing Hypotheses). The scenarios analyzed focused on status quo management, and options that emphasized either juvenile transportation or hydro-project drawdown. PATH also included sensitivity analyses to alternative harvest rates and habitat effects. PATH estimated the probability of survival and recovery for the seven index stocks using the recovery and escapement threshold levels as abundance indicators. The forward simulations estimated the probability of meeting the survival thresholds after 24 and 100 years.

A 70% probability of exceeding the threshold escapement levels was used to assess survival. Recovery potential was assessed by comparing the projected abundance to the recovery abundance levels after 48 years. A 50% probability of exceeding the recovery abundance levels was used to evaluate recovery by comparing the eight-year mean projected abundance. In general, the survival and recovery standards were met for operational scenarios involving drawdown, but were not met under status quo management or for the scenarios that relied on juvenile transportation (Marmorek et al. 1998). If the most conservative harvest rate schedule was assumed, transportation scenarios came very close to meeting the survival and recovery standards.

For the Snake River spring/summer chinook ESU as a whole, NOAA Fisheries estimates the median population growth rate (lambda), from 1980-1994, ranges from 1.012 to 0.796 (Table 3), depending on the assumed success of hatchery fish spawning in the wild. Lambda decreases with increasing success of instream hatchery fish reproduction, compared to fish of wild origin (Tables B-2a and B-2b in McClure et al. 2000). NOAA Fisheries estimated the risk of absolute extinction for the aggregate Snake River spring/summer chinook population to be zero in 24 years regardless of hatchery fish reproduction, and from 0.00 to 1.00 in 100 years, depending the success of instream hatchery fish reproduction (Table 3). This analysis period does not include the higher returns observed since 1996. Since 1996, the average proportional increase in hatchery fish compared to wild fish has been substantially greater, consequently, even though the number of recruits per spawner has increased for natural fish since lambda was calculated, the estimate of lambda for natural fish may actually decline from the values in Table 3, due to the disproportionate increase in hatchery fish.

Table 3. Annual rate of population change (λ) in Snake River Spring Chinook salmon, absolute risk of extinction (1 fish/generation), and risk of 90% decline in 24 and 100 years for the period 1980-1994†. The range of reported values assumes that hatchery-origin fish either do not contribute to natural production or are as productive as natural-origin spawners.

Model Assumptions	l	**Risk of Extinction**		**Probability of 90% decrease in stock abundance**	
		24 years	100 years	24 years	100 years
No Correction for Hatchery Fish	1.012	0.00	0.00	0.014	0.072
No Instream Hatchery Reproduction	0.964	0.00	0.04	0.002	0.914
Instream Hatchery Reproduction = Natural Reproduction	0.796	0.00	1.00	0.996	1.000
† From Table B-2a and B-2b. Cumulative Risk Initiative. September 5, 2000, revised appendix B (McClure et al. 2000).					

1.2.2 Lower Snake River Subbasin

Information on spring/summer chinook salmon distribution, important watersheds, and conditions and trends in the Lower Snake River is summarized from the Lower Snake Subbasin Biological Assessment (BLM 2000a).

1.2.2.1 Species Distribution

Spring/summer chinook salmon use the mainstem Snake River for upstream and downstream migration and, to a limited extent, juvenile rearing. Migrating adult salmon may use the Snake River for staging prior to migrating to natal streams to spawn. Accessible tributary streams are used for spawning and/or juvenile rearing when stream conditions are suitable. Asotin Creek is the only tributary stream that is currently used for spawning and rearing by chinook salmon. Juvenile rearing may occur at the mouth or lower reach of accessible tributary streams. The Snake River has elevated summer water temperatures that are sub-optimal for rearing, therefore, tributary streams provide cool water refugia for juveniles. Often these tributary streams may have low water barriers, but are accessible during high spring flows (i.e., June). Low numbers of rearing juvenile chinook salmon may be found in the lower reaches of larger tributary streams. It should be noted that other smaller accessible tributaries may potentially be used if stream conditions are favorable.

1.2.2.2 Location of Important Spawning and Rearing Areas

Asotin Creek is an important spawning and rearing watershed for spring/summer chinook in the Lower Snake River Subbasin. Historically, other larger tributaries within the subbasin (i.e., Captain John Creek) may have been used for spawning and rearing. Priority watersheds identified for spring/summer chinook salmon include Asotin and Captain John Creeks.

1.2.2.3 Conditions and Trend of Populations

The Bureau of Land Management (BLM) noted that current numbers of naturally spawning spring/summer chinook salmon in the Lower Snake River Subbasin are at all time lows, and the overall trend is downward. Asotin Creek is the only tributary stream that is used by chinook salmon for spawning. Current use of Asotin Creek by spring/summer chinook is at very low levels and does not have a stable return of adults (BLM 2000a).

<u>1.2.3 Lower Salmon River Subbasin</u>

Information on spring/summer chinook salmon distribution, important watersheds, and conditions and trends in the Lower Salmon River is summarized from the Lower Salmon River Subbasin Biological Assessment (BLM 2000b), except where noted..

1.2.3.1 Species Distribution

Spring/summer chinook salmon use the mainstem Salmon River for upstream and downstream migration and, to a limited extent, juvenile rearing. Migrating adult salmon may use the Salmon River for staging prior to migrating to natal streams to spawn. Accessible tributary streams are used for spawning and/or juvenile rearing when stream conditions are suitable. Slate Creek and White Bird Creek are the only tributary streams that are currently used for spawning and rearing. Stray adult chinook salmon may be found occasionally in other tributary streams (i.e., John Day Creek and French Creek). Juvenile chinook salmon rearing may occur at the mouth or lower reach of accessible tributary streams. The Salmon River has elevated summer water temperatures that are sub-optimal for rearing, therefore, tributary streams may provide cool water refugia for juveniles. Often these tributary streams have low water barriers, but are accessible during high spring flows (i.e., June). Tributary streams that may be used by juvenile chinook salmon for rearing include China, Eagle, Deer, Cottonwood, Maloney, Deep, Rice, Rock, Skookumchuck, John Day, Race, Lake, Allison, Partridge, Elkhorn, and French Creeks. It should be noted that other smaller accessible tributaries may potentially be used if stream conditions are favorable.

1.2.3.2 Location of Important Spawning and Rearing Areas

Slate Creek and White Bird Creek are important spawning and rearing watersheds for spring/summer chinook salmon in the lower Salmon River drainage. Historically, other larger tributaries may have been used for spawning and rearing. Priority watersheds identified for spring/summer chinook salmon within the subbasin include China, Eagle, Deer, White Bird, Skookumchuck, Slate, John Day, Race, Partridge, and French Creeks.

1.2.3.3 Conditions and Trend of Populations

The BLM noted that current numbers of naturally spawning spring/summer chinook salmon in the Lower Salmon River Subbasin are at all time lows, and the overall trend is downward. Slate Creek is the only tributary stream that is used by chinook salmon annually for spawning. White Bird Creek may be used by stray adults on occasion, but such use is expected to be very low (BLM 2000b).

<u>1.2.4 Little Salmon River Subbasin</u>

Information on spring/summer chinook salmon distribution, important watersheds, and conditions and trends in the Little Salmon River is summarized from the Little Salmon River Subbasin Biological Assessment (BLM 2000c), except where noted.

1.2.4.1 Species Distribution

Spring/summer chinook salmon occur in the lower portion of the Little Salmon River and its tributaries, downriver from barriers located on the mainstem at river mile (RM) 24. An 1879 account of a trip through the Little Salmon River valley stated: “That salmon did not come into the valley because of rapids and falls below apparently prevented them” (Wiley 1879). No recent or formal historic documentation exists for spring/summer chinook salmon using streams above the RM 21 barrier. Welsh et al. (1965), reports that no known passage by salmon or steelhead exists above the Little Salmon River falls (RM 21). Ineffectual fish passage facilities were constructed at the falls by the Civilian Conservation Corps during the 1930s (Welsh et al. 1965). Streams and rivers providing spawning and rearing for spring/summer chinook salmon include the Little Salmon and Rapid Rivers, and Boulder, Hazard, and Hard Creeks. Mainstem Little Salmon River tributary streams providing potential rearing habitat at the mouth and/or lower reach area only (below barrier) include Squaw, Sheep, Hat, Denny, Lockwood, Rattlesnake, Elk, and Trail Creeks. These streams provide sub-optimal rearing habitat because of steep stream gradients, barriers, and small size of tributaries.

1.2.4.2 Location of Important Spawning and Rearing Areas

Priority watersheds for spring/summer chinook salmon in the Little Salmon River Subbasin include Rapid River and Boulder, Hazard, and Hard Creeks. These streams provide spawning and rearing habitat for spring/summer chinook salmon. Rapid River is a stronghold and key refugia area for spring/summer chinook salmon.

1.2.4.3 Conditions and Trend of Populations

The BLM noted that current numbers of naturally spawning spring/summer chinook salmon in the Little Salmon River Subbasin are at all time lows, and the overall trend is downward. The highest number of intercepted adult natural spawning chinook salmon counted at the Rapid River weir was 1,269 in 1985, and the lowest counted was 4 in 1997. In 1998, a total of 42 adult natural spawning chinook salmon were counted and in 1999 a total of nine natural spawning chinook salmon were counted (BLM 2000c).

1.2.5 Middle Salmon River Subbasin

Information on spring/summer chinook salmon distribution, important watersheds, and conditions and trends in the Middle Salmon River is summarized from the Middle Salmon River and South Fork Salmon River Subbasins Biological Assessment (BLM 2000d), except where noted.

1.2.5.1 Species Distribution

Spring/summer chinook salmon use the mainstem Middle Salmon River for upstream and downstream passage. A limited amount of juvenile rearing may also occur in the Salmon River. Spawning and rearing for spring/summer chinook salmon occurs in lower Wind River and

Crooked, Bargamin, Chamberlain, and Horse Creeks. Other accessible tributaries may be used for juvenile rearing when flow conditions and water temperatures are acceptable. Use generally occurs in the mouth area or lower reaches of tributary streams.

1.2.5.2 Location of Important Spawning and Rearing Areas

Priority watersheds for spring/summer chinook salmon in the Middle Salmon River Subbasin include Bargamin and Warren Creeks. These streams provide spawning and rearing habitat for adult and juvenile spring/summer chinook salmon. Spring/summer chinook salmon juveniles were observed in Warren Creek from the mouth to RM 2.4 (USFS 1998). Raleigh (1995), conducted snorkeling surveys in Warren Creek in late August 1994, and found juvenile chinook salmon in the lower reach only (RM 2.4). Spring/summer chinook salmon may use the mouth area or lower reaches of accessible tributaries such as Carey, California, and Bear Creeks for rearing.

1.2.5.3 Conditions and Trend of Populations

The BLM noted that current numbers of naturally spawning spring/summer chinook salmon in the Middle Salmon River Subbasin are at all time lows, and the overall trend is downward (BLM 2000d).

<u>1.2.6. South Fork Salmon River Subbasin</u>

Information on spring/summer chinook salmon distribution, important watersheds, and conditions and trends in the South Fork Salmon River is summarized from the Middle Salmon River and South Fork Salmon River Subbasins Biological Assessment (BLM 2000d), except where noted.

1.2.6.1 Species Distribution

Most spring/summer chinook salmon spawning areas within the South Fork Salmon River are found upstream of the confluence of the Secesh River and the South Fork Salmon River. The largest spawning concentration occurs in the Poverty Flats to Fourmile area and in Stolle Meadows.

1.2.6.2 Location of Important Spawning and Rearing Areas

Concentrated spawning areas for Snake River spring/summer chinook salmon are found in the Glory Hole, Oxbow, Lake Creek, and Dollar Creek areas, the Icehole area in Johnson Creek, and the Secesh Meadows in the Secesh River. Rearing and overwintering occurs throughout the South Fork Salmon River.

1.2.6.3. Conditions and Trend of Populations

Historically, the South Fork Salmon River was the single most important summer chinook spawning stream in the Columbia River Basin (Mallet 1974). Redd counts in the South Fork have declined from 3,505 redds in 1957, to 810 in 1992. The Secesh River and Lake Creek redd counts (combined) were more than 500 redds in 1960 and declined to a low of 10 redds in 1975. Counts of 112 redds in 1991 dropped to 28 redds in 1995 (IDFG 1995). Based on standard transects (IDFG 1992), chinook parr densities are estimated to be less than 15% of potential habitat carrying capacity.

1.2.7 Upper Salmon River Subbasin

Information on chinook salmon distribution, important watersheds, and conditions and trends in the Upper Salmon River is summarized from the Biological Opinion on Effects of 2002 Herbicide Treatment of Noxious Weeds on Lands Administered by the Salmon-Challis National Forest (NOAA Fisheries 2002a), and the Biological Opinion on L3A Irrigation Diversion Modification in the Lemhi River (NOAA Fisheries 2002b)

1.2.7.1 Species Distribution

Spring/summer chinook salmon in the Upper Salmon River Subbasin may occur in most of the accessible streams when stream conditions are suitable. Chinook salmon use the mainstem Salmon River for upstream and downstream passage. Spawning and rearing may also occur in the mainstem Salmon River. In addition, most accessible tributaries may be used by spring/summer chinook salmon for spawning and rearing.

1.2.7.2 Location of Important Spawning and Rearing Areas

Important spring/summer chinook salmon spawning and rearing areas in the Upper Salmon River Subbasin probably occurs in Yankee Fork Salmon, Pahsimeroi River, East Fork Salmon River, Lemhi River and Pole, Alturas Lake, Valley, and Loon Creeks.

1.2.7.3 Conditions and Trend of Populations

Compared to the greatly reduced numbers of returning adults for the last several decades, increased numbers of adult chinook salmon returned to the Upper Salmon River drainage in 2000 and 2001. These large returns are thought to be a result of favorable ocean conditions, and above average flows in the Columbia River Basin when the smolts migrated downstream. However, these large returns are only a fraction of the returns of the late 1800s. Recent increases in the population are not expected to continue, and the long-term trend for this species indicates a decline (NOAA Fisheries 2002b).

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APPENDIX C

NOAA Fisheries Backpack Electrofishing Guidelines**:**

BACKPACK ELECTROFISHING GUIDELINES

December 1998

http://www.nwr.noaa.gov/1salmon/salmesa/pubs/electrog.pdf

Suggested protocol for the use of backpack electrofishing equipment in waters containing fish listed under the Endangered Species Act (ESA).

These recommendations should be seen as guidelines for developing consistent and safe electrofishing technique. It is hoped that these guidelines will ultimately help improve electrofishing technique in ways which will reduce fish injury and increase electrofishing efficiency.

Purpose and Scope

The purpose of this document is to recommend guidelines for using backpack electrofishing equipment to sample ESA-listed fish. Because electrofishing can kill or severely injure fish, every effort should be made to avoid electrofishing and use snorkeling or other fishery information collection techniques. Where electrofishing is the only suitable sampling method, these guidelines are suggested to help reduce the number of fish killed or severely injured.

These guidelines are concerned only with studies that involve electrofishing juvenile or adult salmonids that are *not* in spawning condition. Electrofishing in the vicinity of adults in spawning condition or operating equipment in the vicinity of redds containing developing eggs is not discussed as there is no justifiable basis for permitting these activities near listed species.

Also, these guidelines do not deal with factors such as temperature or fish handling technique both of which can significantly affect fish health during an electrofishing session. None the less, all ESA-listed fish must be sampled with extreme care. The field crew must carefully design the sampling sessions to minimize fish stress by working within favorable temperature regimes, using anesthetics when necessary, and minimizing the time the fish are held before release. As with all fieldwork involving live ESA-listed fish, the best science should be used along with an experienced crew and good equipment in order to minimize handling stress.

Equipment

Equipment should be in good working condition. Operators should go through the manufacturer's preseason checks, adhere to all provisions, and record major maintenance work in a log.

Training

A crew leader having at least 100 hours of electrofishing experience in the field using similar equipment should train the crew. The crew leader's experience must be documented and available for confirmation; such documentation may be in the form of a logbook. The training should occur before an inexperienced crew begins any electrofishing; it should also be conducted in waters that do not contain ESA-listed fish.

The training program must include the following elements:

1. Definitions of basic terminology: e.g. galvanotaxis, narcosis, and tetany.
2. An explanation of how electrofishing attracts fish.
3. An explanation of how gear can injure fish and how to recognize signs of injury.
4. A review of these guidelines and the manufacturer's recommendations.
5. A demonstration of the proper use of electrofishing equipment, the role each crew member performs, and basic gear maintenance.
6. A field session where new individuals actually perform each role on the electrofishing crew.

Specific Electrofishing Guidelines

The following guidelines are recommended for all electrofishing sessions.

1. Coordinate research activities with fishery personnel from other agencies to avoid duplication of effort and unnecessary stress on fish. In order to avoid contact with spawning adults or active redds, carefully survey the area to be sampled before beginning electrofishing.

2. Measure conductivity and set voltage as follows:

Conductivity (umhos/cm)	Voltage
Less than 100	900 to 1100
100 to 300	500 to 800
Greater than 300	150 to 400

3. Only direct current (DC) should be used.

4. Each session should begin with pulse width and rate set to the minimum needed to capture fish. These settings should be gradually increased only to the point where fish are immobilized and captured. Start with pulse width of 500us and do not exceed 5 milliseconds. Pulse rate should start at 30Hz and work carefully upwards. *In*

general, exceeding 40 Hz will injure more fish.

5. The zone of potential fish injury is 0.5m from the anode. Care should be taken in shallow waters, undercut banks, or where fish can be concentrated because in such areas the fish are more likely to come into close contact with the anode.

6. The stream segment should be worked systematically, moving the anode continuously in a herringbone pattern through the water. Do not electrofish one area for an extended period.

7. Crew should carefully observe the condition of the sampled fish. Dark bands on the body and longer recovery times are signs of injury or handling stress. When such signs are noted, the settings for the electrofishing unit may need adjusting. Sampling should be terminated if injuries occur or abnormally long recovery times persist.

8. When the sampling design involves taking scales and measurements, a healthy environment for the stressed fish must be provided and the holding time must be minimized. Water to water transfers, the use of shaded, dark containers and supplemental oxygen should all be considered in designing fish handling operations. For these operations, additional crewmembers who are experienced in holding and processing stressed fish may be necessary.

9. Whenever possible, a block net should be placed below the area being sampled to capture stunned fish that may drift downstream.

10. The electrofishing settings should be recorded in a logbook along with conductivity, temperature, and other variables affecting efficiency. These notes, together with observations on fish condition, will improve technique and form the basis for training new operators.